

# FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

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## Flight.

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## EDITORIAL COMMENT.

### The Round Britain Flight.

At the eleventh hour the authorities appear to have waived most of their objections to the *Daily Mail's* Round Britain waterplane race, and the event, it is now stated, will be started from Southampton as originally intended. The following official statement with regard to the race was issued on Monday by the Royal Aero Club:—

"The Secretary of State for War (Col. Seely, M.P.) visited Southampton this morning, together with the Marquis of Tullibardine (chairman of the Royal Aero Club) and Gen. Henderson (representing the War Office), for the purpose of trying to come to some arrangement satisfactory to both parties in connection with the *Daily Mail* Circuit of Britain £5,000 waterplane race.

"The War Office has offered every facility for starting the race from Southampton Water, and the regulations affecting some of the prohibited areas have been rescinded altogether, and in other cases relaxed so far as this race is concerned."

So, having vacillated between "We will" and "We will not" for long enough to knock the whole bottom out of the race, the authorities have at last condescended to take up a reasonable attitude! The most obvious comment to be made is that they might just as well have viewed the matter from the present standpoint at first, and so have given the race a chance of success. As the

*Daily Mail* itself points out, the Round Britain race of 1911, in which there was no official interference, brought a total of 27 entrants, of whom exactly 20 actually started. Up to the time of writing, the sum total of the entries received for the race, which is due to commence on the 16th of next month, is precisely four! Truly, the most scathing commentary on this latest exhibition of hide-bound official impossibility is that contained in the result itself. Here was a race designed to develop the very type of aircraft which the naval and military authorities tell us is the one they are most anxious to see developed, and the plain, everyday person would have thought that so far from bringing into operation the provisions of a law designed to prevent espionage from the air, a too literal construction of which might militate against the event, they would, if necessary, have even gone to the length of rushing through a short Act of Parliament exempting the race from the incidence of the existing law. That, however, was not in the least necessary, since the interpretation and enforcement of the law lies with the military and naval authorities, and it only required a word from them to have made everything plain and straightforward. That word has not been spoken until the event has been practically ruined.

In no country in the world would the authorities have made so sorry an exhibition. Not even in regulation-ridden Germany, the most military nation of all, and the one with the greatest number of military secrets to guard, would official interference have taken such a form. That this is no empty phrase we have earnest in the fact that while our own authorities succeeded in preventing the Aerial Derby round London, there is shortly to be held another race round Berlin, and, so far as it is possible to judge from the published regulations, official interference is mainly conspicuous by its absence. There is much more that we could say on this sorry subject, but the whole thing leaves such a nasty taste that we are glad to get away from it altogether in the meantime, though we await with interest the explanation that must surely come before the matter is allowed to lapse into oblivion.

### The Right to the Air.

We were interested to see in the report of a recent case at the Stratford police court that even yet there are people who hold to the old Roman interpretation of the law of possession, that the rights of the landed proprietor extend to the air above his land up to the sky. The case

was one in which a landowner was sued for the value of pigeons he had shot with a bow and arrow, and his solicitor contended that the birds were trespassing by flying above his client's land. The Bench, however, do not seem to have thought much of the defence, inasmuch as they registered a conviction and condemned the defendant to pay the value of the injured pigeons.

The defence was undoubtedly ingenious, though we are not inclined to subscribe to the opinion that it deserved to succeed because of its ingenuity. After all, trespass is not even a misdemeanour unless it is accompanied by proved damage, and we can hardly stretch our imagination far enough to believe that damage can be caused by the mere flying over land of anything from a sparrow to an aeroplane. Besides, it is bad enough to have to deal with "prohibited areas" under the Aerial Navigation Acts, when we have the law administered by officials whose one fetish is red-tape, but if we are to have our birds and aircraft made into targets for every cross-grained landowner who practises archery we shall soon come to a pretty pass. However, there is very little chance of a revival of the long obsolete doctrine of ownership of the air.

## An Aerial Passenger Service.

According to our daily contemporaries, we are to have a regularly-established million pound capitalised aerial passenger service by Christmas. At the outset, it is said, services are to be inaugurated between London and Manchester, London and Birmingham, London and Brighton, and London and Paris. For the present, though ready to consider any type of airship offered for their approval,

the promoters of the enterprise have decided upon a ship of the semi-rigid type, fitted with 270 h.p. motors, and capable of a speed of sixty miles per hour. Two of these are to be ready to open the service, and before a year has passed it is expected that quite half-a-dozen will be carrying passengers.

We have had particulars of schemes of this character laid before us from time to time, and it seems strange that nothing in the way of information regarding so important an aerial enterprise as the present one has reached us direct, though we accept the statements, as set out in the dailies, that the service is actually in contemplation, and extend our heartiest welcome to it. If it should materialise in the shape it is apparently intended to assume, it is scarcely possible to exaggerate its importance. It will mark a new epoch in British aeronautics, and one which cannot fail to be of inestimable value to the movement, since it must bring home to the man in the street the outstanding fact that aerial navigation has long passed the doubtful stage. This is one of the principal difficulties in the way of development at the present time. People simply do not realise how important a bearing flight has upon the future of this country, and the consequence is that, despite all the efforts of those who really do know, there is really no public opinion that counts. That is why our Government is so hard to move, and why we are lagging so hopelessly behind our rivals. For these reasons, apart altogether from our desire to see aeronautics prosper commercially, we shall be rather more than pleased if this latest scheme, unlike the many previously mooted, turns out to have the necessary material support behind it.



## MR. F. WARREN MERRIAM. PILOT INSTRUCTOR.

MR. F. W. MERRIAM, the subject of our portrait in this issue of FLIGHT, is one of the school of pilots, most of whom have turned out excellent flyers, who entered aviation through the useful mechanical training of motor car driving. So long ago as 1903, Mr. Merriam was the owner of his own car, which he drove practically all over England, and later abroad. A native of Falmouth, he there started a small garage, having previously been through the motor workshops, and acquired all there was to learn in those days about the cars and engines he was called on to drive. The call of the air gripped him in the early days of flying, but family reasons prohibited his taking it up till 1911.

On joining the Bristol School as a pupil, he was not content to take lessons in flying only, but worked hard in the sheds assisting the mechanics, and learning everything thoroughly. Here he had plenty of time, as tuition was hardly as rapid in the early days as it is to-day. At that time, no instructor would ever have dreamt of going up behind a pupil, and teaching him the controls during actual flight, as it is done now. Moreover, Mr. Merriam was one of those who did not believe in going too fast, preferring to go step by step, each step to be thorough.



### Army Air Service Department.

It should be a source of general satisfaction to know that Brigadier-General Henderson, whom our readers will remember as one of the early military pilots to secure a *brevet* (No. 118), will be in direct control as Director-General of the new Army Air Service Department foreshadowed in Parliament by Col. Seely on Wednesday last. General Henderson qualified as a pilot on a Bristol biplane at Brooklands in August, 1911.

It was on February 6th, 1912, that he eventually became the proud possessor of certificate No. 179, taken on a Bristol biplane. During that year he had continuous practice in flying the machines of the Bristol Company, including the E.N.V. tractor, and the monoplane. Still sticking to his old school, in September of that year he was appointed chief instructor and manager for the Bristol Company at Brooklands. Mr. Merriam is recognised as a most painstaking instructor, and gets his pupils through in as short a time as he thinks consistent with sound teaching. Since taking charge, he has had 62 pupils pass for their certificates at Brooklands almost without a mishap, and at any rate without any serious accident, which is something to be proud of, and speaks volumes for his methods of tuition.

In his own flying—he has had but one accident—Merriam has been—shall we say lucky?—no, I do not think it is so much luck as sound judgment, and a thorough knowledge of his art. Like most Brooklands pilots, he did not escape the magnetic attractions of the sewage farm, which sooner or later seems to force an introduction to all.

"THE HAWK."



### The Daily Mail Round Britain Race.

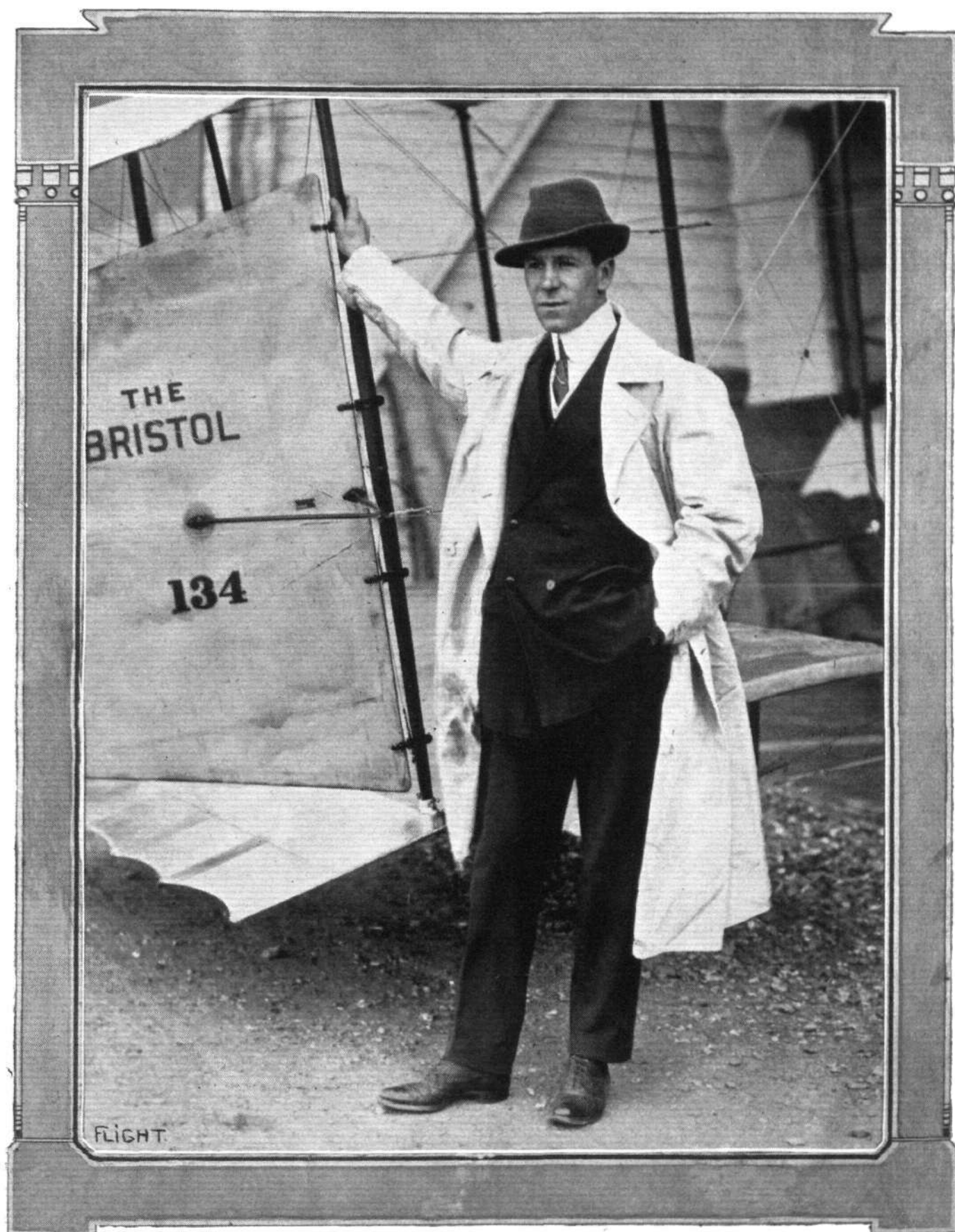
As will be seen from the Royal Aero Club Official Notices on page 791, when the entries for the *Daily Mail* Round Britain Race closed at ordinary fees on Wednesday last, they numbered four, the entrants being Messrs. T. O. M. Sopwith, S. F. Cody, James Radley, and F. K. McClean. It will also be seen that the start of the race on August 16th will be from Southampton Water, the War Office having granted the necessary exemptions.



JULY 19, 1913.

**FLIGHT**

# MEN OF MOMENT IN THE WORLD OF FLIGHT. Pilot-Instructors.



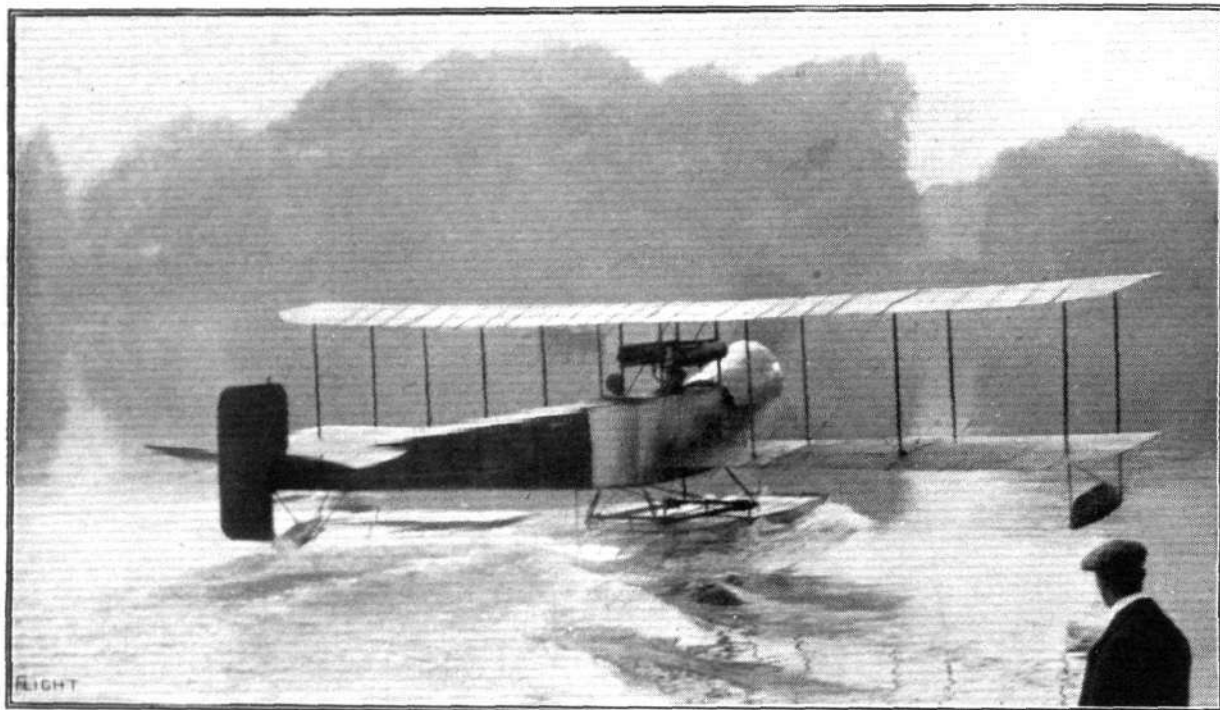
MR. F. WARREN MERRIAM.

# THE LAKES FLYING CO.'S TRACTOR WATERPLANE.

IN its general appearance the tractor waterplane owned by the Lakes Flying Co. is somewhat reminiscent of the Avro machines. This impression is no doubt created by

is quite simple, and consists of two skids connected to the body by four streamline struts.

A single central float of a special patented design

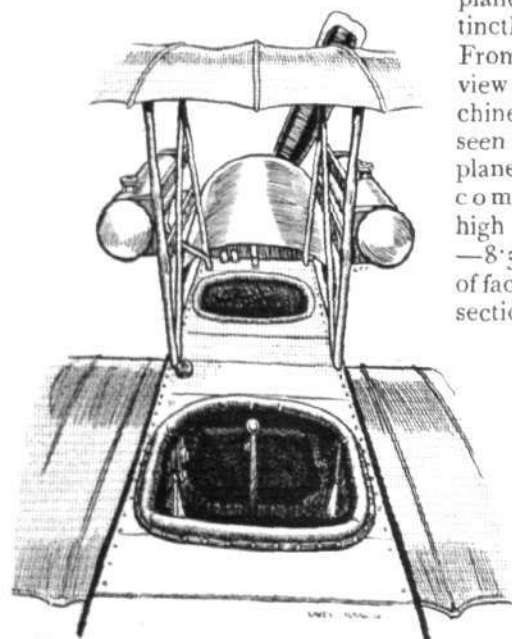


The Lakes Flying Company's tractor hydro-biplane, just getting away with a passenger.

the shape of the body and tail planes, which as a matter of fact are the remains of a machine built by Messrs. A. V. Roe and Co. for Mr. J. Duigan, the Australian aviator.

This similarity, however, is confined to the rear part of the machine, the front portion, including the main

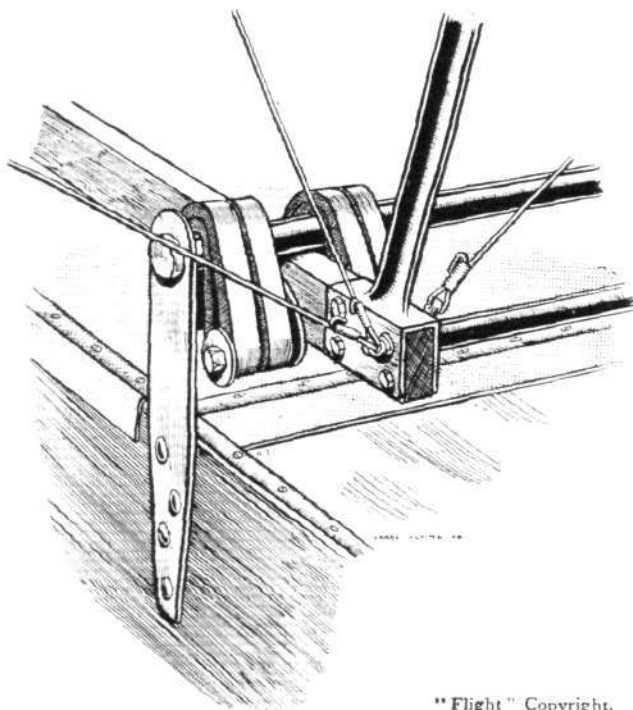
planes, being distinctly different. From the plan view of the machine it will be seen that the main planes have a comparatively high aspect ratio—8.5 as a matter of fact. The wing section is the same as the old Maurice Farman, *i.e.*, analogous to Eiffel No. 12. Eight pairs of streamlined struts connect the main planes, the whole structure being cross-braced with



Sketch of the cockpits and mounting of fuel and oil tanks.

steel wire in the usual fashion. In order to impart to the machine a certain amount of natural lateral stability, the main planes are given a dihedral angle. The chassis

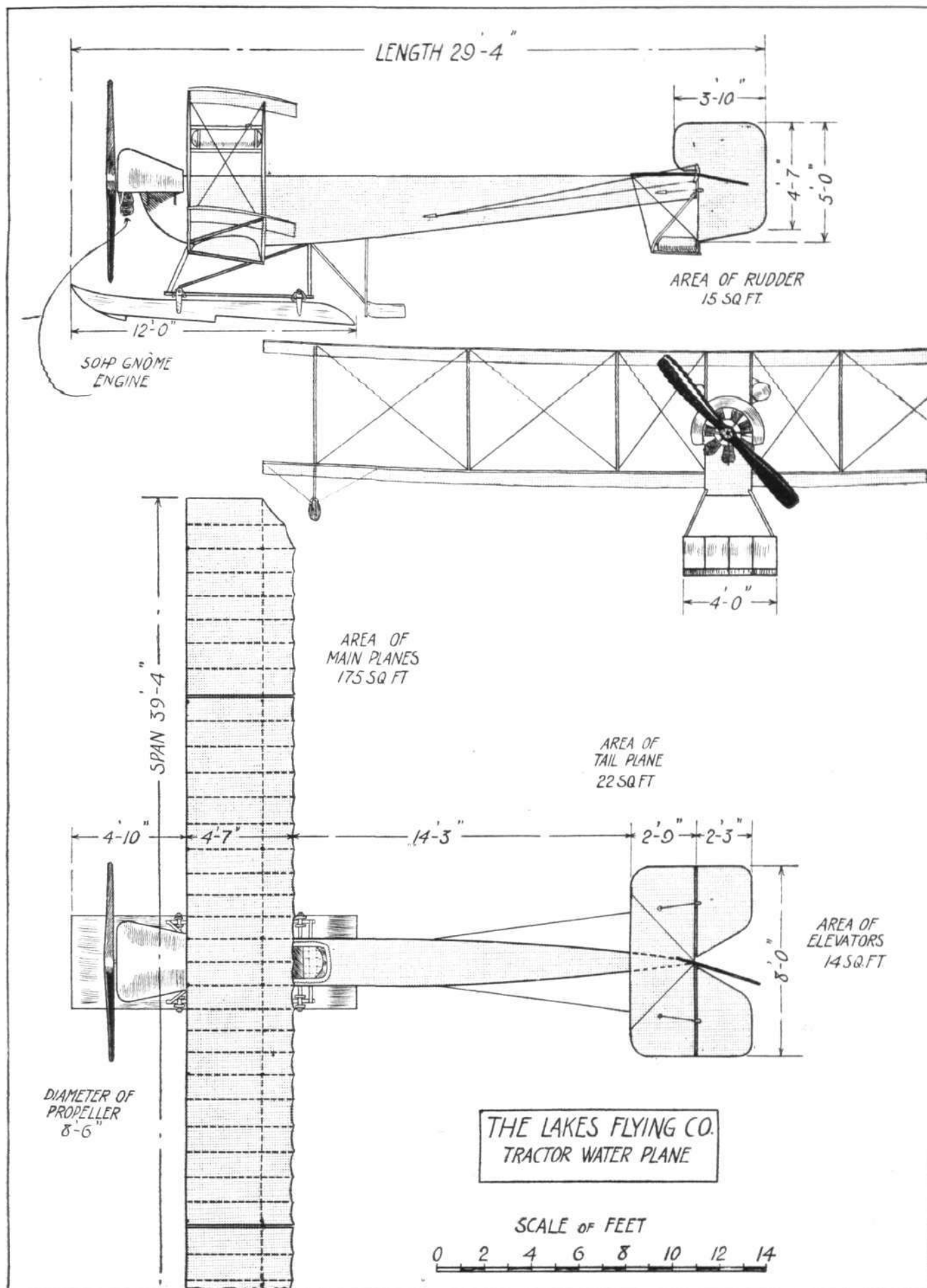
supports the machine when on the water. It is divided into eight watertight compartments, which form a central framework of wood, with duralumin sides, aluminium



Sketch showing how the main float is sprung from chassis by means of rubber shock-absorbers.

bottom and Willesden canvas top. In order to minimise the shock when alighting on the water, the float is sprung from the chassis skids, by means of rubber

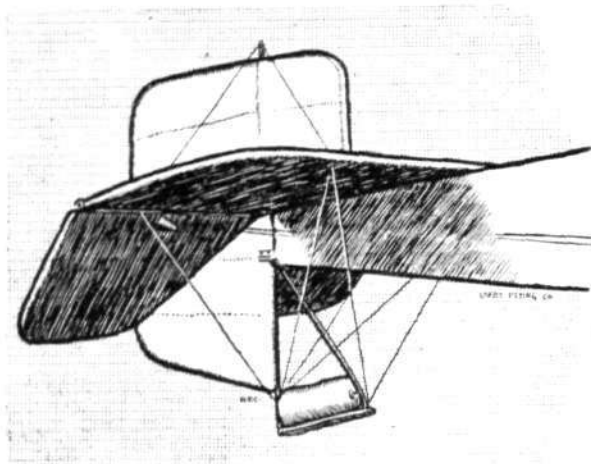




THE LAKES FLYING CO.'S WATERPLANE.—Plan, side and front elevations to scale.

shock-absorbers, in the manner shown in one of the accompanying sketches. It will be seen that this method of attaching the float to the chassis is so simple that the machine could in a very short time be converted into a land machine by substituting a pair of wheels for the float.

In a machine like this, having only a single central float, it has naturally been found necessary to protect in



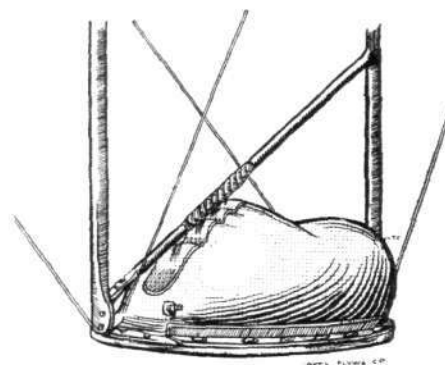
"Flight" Copyright.

Tail planes and float.

some way the wing-tips against contact with the water. This has been effected by fitting balancers or floats, consisting of an air-sack mounted on a springboard, to the wing-tip. A float of similar construction takes the weight of the tail when the machine is at rest on the water. For steering when "taxiing" at slow speeds, a small water-rudder, situated to the rear of the main float and working in conjunction with the air-rudder, is provided.



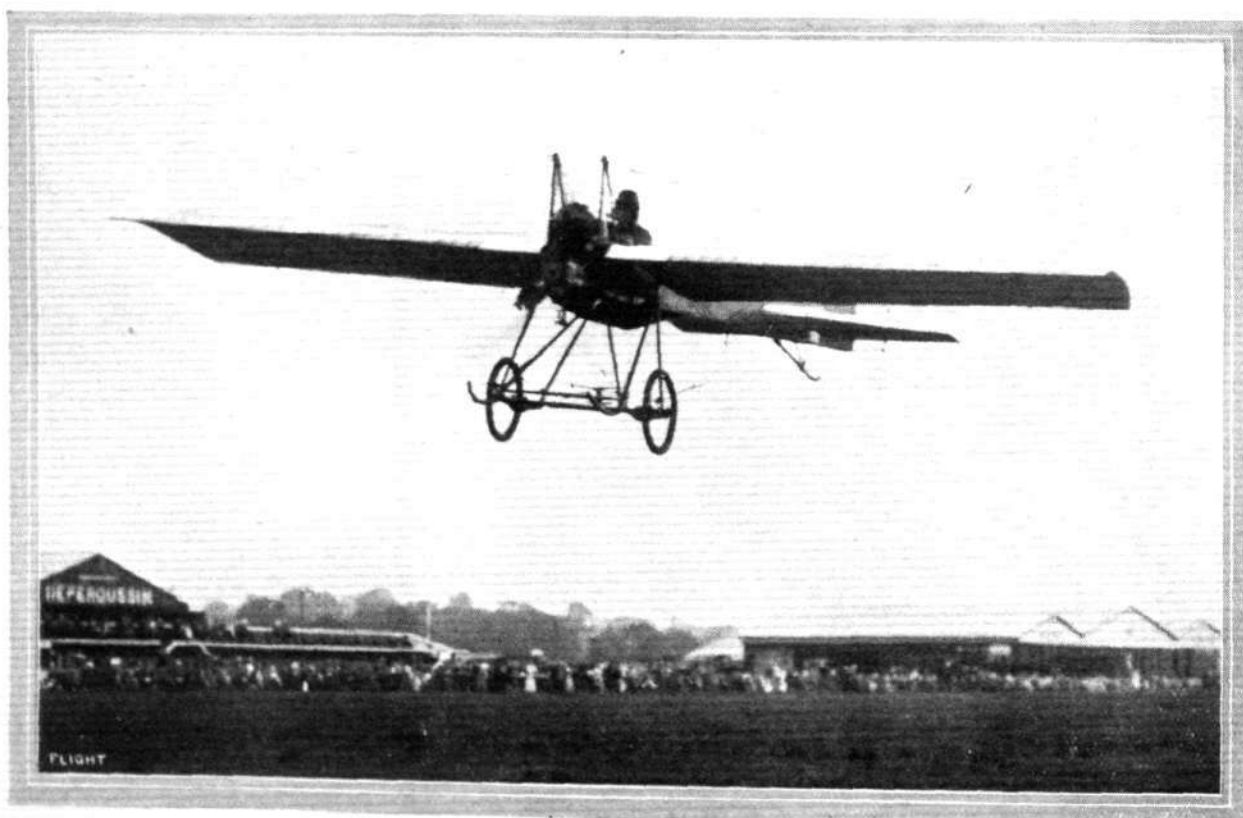
Just behind the trailing-edge of the main planes, and well down inside the fuselage, is the pilot's seat, from whence the machine is controlled by means of a central-pivoted hand-lever, which is moved backwards and forwards for elevation and depression, and from side to side for wing warping. A foot-bar operates the rudder. In front of the pilot, and approximately over the centre of gravity, is the passenger's seat, this disposition giving a very good view in all directions. The engine—a 50 h.p. Gnome—is overhung, *i.e.*, has no



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One of the pneumatic floats on wing tip.

bearing between it and the propeller. The latter is of the L.F.C.'s own design, and has brass-bound tips to prevent splitting, should it have to negotiate a spray of water thrown up by the float. The petrol and oil tanks are supported between the inner two pairs of plane struts, as shown in one of our sketches. The speed range of the machine is from 50 to 62 m.p.h., and it carries a passenger quite easily when the engine is pulling properly.



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Mr. Brock on the 35 h.p. Deperdussin, entering the last lap—heat one—in the speed handicap at Hendon.

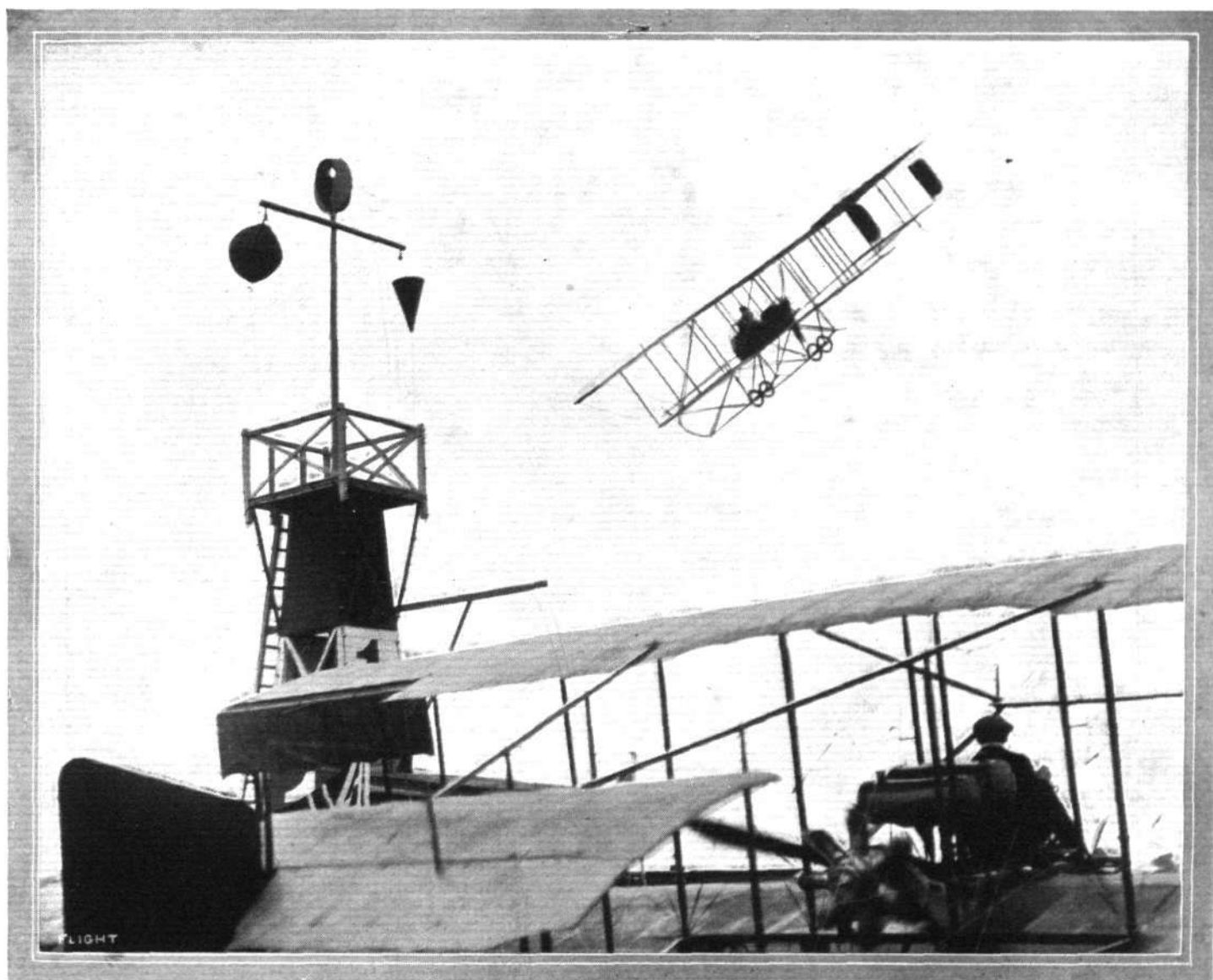
## FLYING AT HENDON.

WHAT might be the commencement of an American invasion so far as the aeroplane industry is concerned must be written down as the most important event up at Hendon last week, for Geo. W. Beatty, the well-known American stunt flyer, accompanied by his Wright biplane fitted with a 50 h.p. Gyro rotary engine, has just joined the ranks of the Hendon flyers—for how long is at present uncertain. On Thursday of last week, he gave a preliminary sample of his "stunts," taking with him as passenger on one occasion that lover of anything with risk in it, Capt. Tyrer. Although not so spectacular as Chevillard's flying, Beatty's is none the less remarkable, especially his steeply banked circuits of exceptionally small diameter, during which he hardly drops at all. He manoeuvres the biplane in all directions with great rapidity and ease. The Gyro engine seems to be highly successful, and certainly has a healthy roar that gives one the impression of power.

Beatty and his biplane, which is distinctly the worse for wear, were undoubtedly the centre of attraction at the July meeting last Saturday, which was well favoured by both visitors and fine weather. The proceedings opened with a number of exhibition flights, the first being made by Louis Noel and E. Cheeseman, both on 50 h.p. Grahame-White biplanes. Noel made another flight shortly after on the "G.-W."-Maurice Farman biplane. Beatty then ascended, followed by Marcus D. Manton on the 50 h.p. "G.-W." biplane, both pilots stunting in fine style. The next up was P. Verrier, with a passenger, on the Aircraft Maurice Farman, after which Hamel left for Brooklands on his Blériot monoplane. Cheeseman, Manton, Noel, and Verrier made several passenger flights, and further exhibitions were given by Beatty.

R. Slack on the 60 h.p. Rhone-Morane-Saulnier, J. L. Hill on the 50 h.p. Blériot, and Lewis Turner on the 35 h.p. Caudron also made exhibition flights.

After these exhibitions, the first heat of the Speed Handicap was flown; the course was over six laps of the aerodrome. The limit man (1 min. 52 secs.) was L. W. F. Turner, on a British-built 35 h.p. Caudron biplane—the same machine on which Sydney Pickles obtained his superior *brevet*, the 45 h.p. engine having been replaced by a 35 h.p. W. L. (formally given as H. M.) Brock started second on the 35 h.p. Deperdussin, with 20 secs. start, and Louis Noel, on the 70 h.p. "G.-W."-Maurice Farman biplane was at scratch. Brock soon obtained the lead, and came in first, 44 secs. ahead of Noel, Turner having retired during the last lap. The second heat, also of six laps, resulted in a hard fight for first place between Pierre Verrier, on the Aircraft Maurice Farman (1 min. 4 secs. start), and Robert Slack, on the 60 h.p. Rhone-Morane-Saulnier monoplane (scratch). The former won by 16 secs., Marcus D. Manton, the limit man (3 mins. 46 secs.), on the 50 h.p. Grahame-White biplane, coming in third, 8 secs. after Slack. Brock, Verrier, and Slack flew in the final heat of eight laps, the former receiving 2 mins. 41 secs. start, Verrier 1 min. 12 secs. start, and Slack being scratch. Brock put up a fine struggle to retain the lead, flying very low and close to the pylons, but Verrier, who took the corners in his usual style, overtook him at the finish, winning by 12 secs. Slack, flying somewhat high and wide, was unable to overhaul his rivals, although he crossed the line only 13 secs. after Brock. After the speed handicap, Beatty put up some more of his stunts, taking with him on one occasion Capt. Tyrer, and executing



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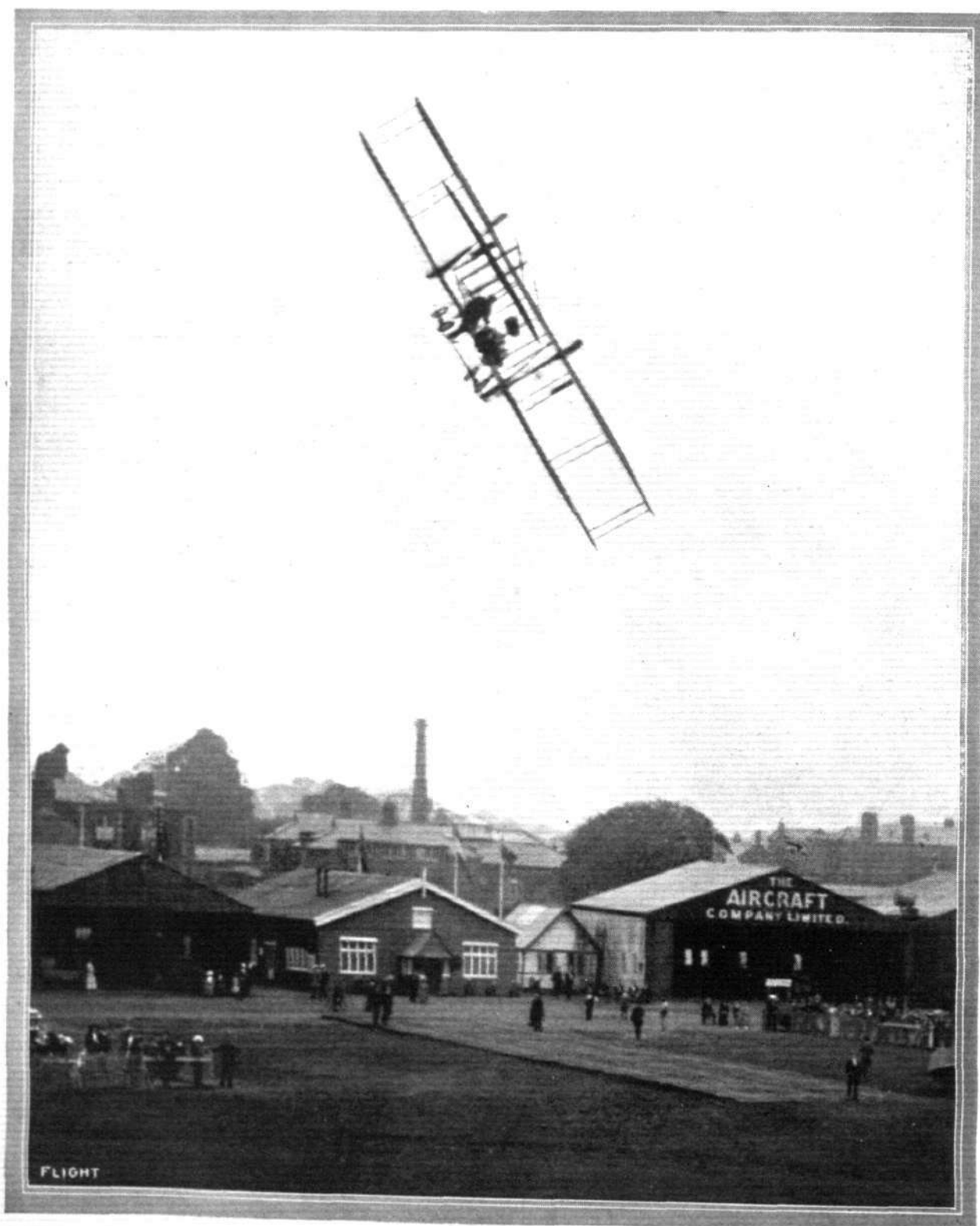
A banked turn with a passenger round No. 1 Pylon at Hendon by Pierre Verrier on the Maurice Farman.



some remarkably small circuits with the machine banked in the neighbourhood of  $70^{\circ}$ . During these evolutions N. Spratt gave some exhibitions on the 60 h.p. Anzani-Deperdussin, making very impressive spiral descents. E. Cheeseman took up several passengers, including a lady from "Come Over Here," on the 50 h.p. "G.-W." biplane, flying very high on one occasion. Manton also made some flights on the same machine, at one time doing some very commendable stunts. Further flights were made by Verrier on the Maurice Farman biplane, J. L. Hall on his 50 h.p. Blériot monoplane, and Turner on the 35 h.p. Caudron biplane, the latter remaining aloft for about 40 mins. M. Debussy made a short flight on a British-built Breguet biplane fitted with a modified landing chassis (with

tail-skid), and an 80 h.p. horizontal Canton-Unné engine. Lieut. Porte made a welcome reappearance on the 110 h.p. Anzani-Deperdussin; Brock also made several flights on the same machine. Late in the evening, Claude Grahame-White made a cross-country flight on his Maurice Farman biplane. Result of Speed Handicap for July Cup presented by Mr. P. Teofani:—

Speed Handicap.	8 miles (12 laps).	Start.		Handicap time.		Net time.	
		m.	s.	m.	s.	m.	s.
1. P. Verrier (70 h.p. M. Farman) ...		1	12	14	15	12	56
2. W. L. Brock (35 h.p. Deperdussin)		2	31	14	27	14	47
3. R. Slack (60 h.p. Morane-Saulnier)	scratch			14	40	12	9



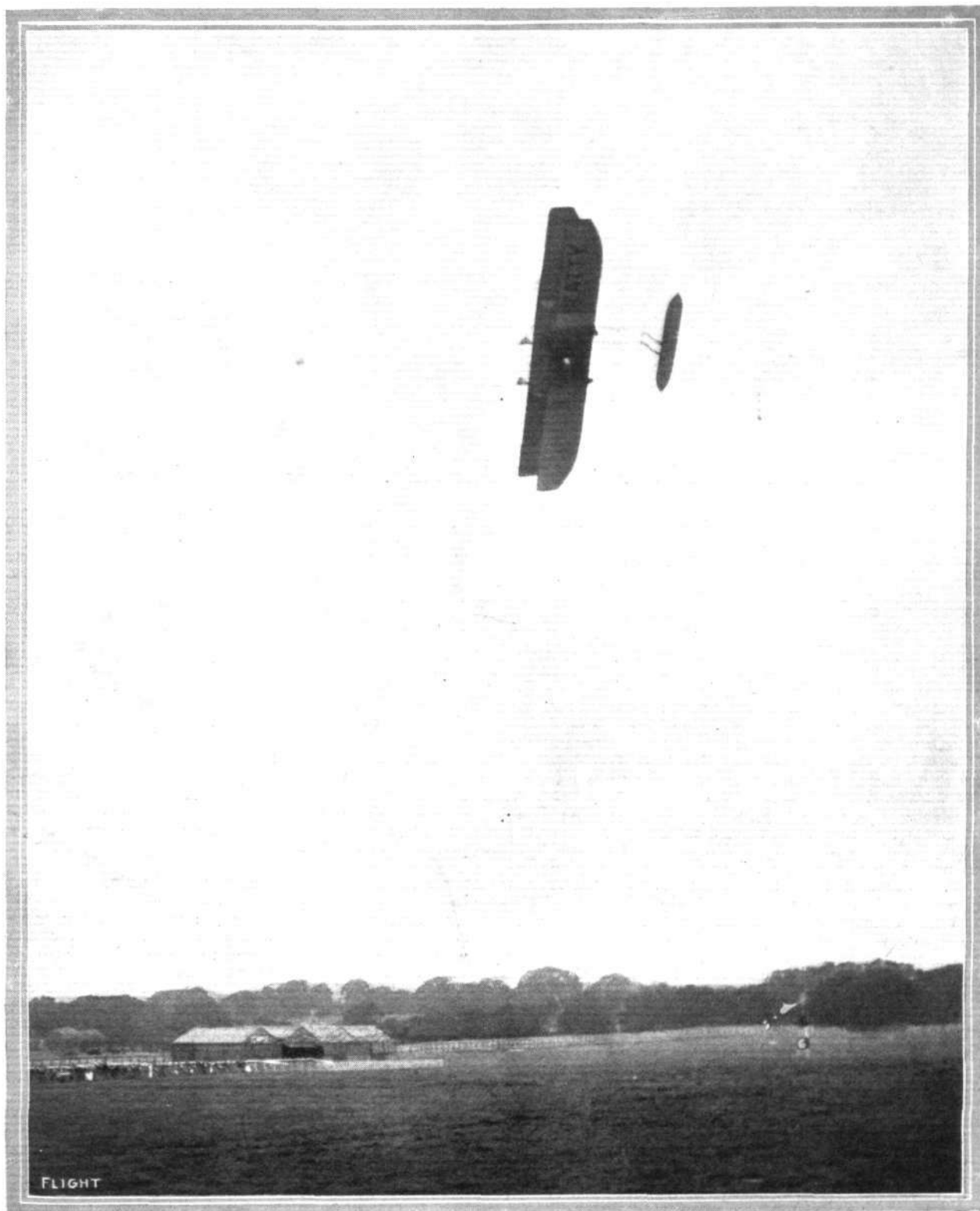
Mr. Beatty making one of his banked turns on his Wright over the sheds at Hendon.

\*Flight" Copyright.

On the Sunday following, about a dozen pilots made ascents, in fact there was hardly a moment during the afternoon when there was not a machine in the air. At one time six machines were aloft together. As on the day before, the star turn was, of course, G. W. Beatty and his 50 h.p. Gyro-Wright biplane. All through the afternoon, the above and the following contributed to the day's amusement:—Pierre Verrier (70 h.p. Aircraft Maurice Farman); Louis Noel (70 h.p. G.-W.-Maurice Farman); E. Cheeseman (50 h.p. Grahame-White biplane); Marcus D. Manton (50 h.p. Grahame-White biplane); L. W. F. Turner (35 h.p. Caudron), E. Baumann (35 h.p. Caudron) flying high as usual; W. L. Brock (passengers on the 110 h.p. Anzani-Deperdussin); N. Spratt (60 h.p. Deperdussin), J. L. Hall (50 h.p. Blériot); and R. Slack on the fast little Morane-

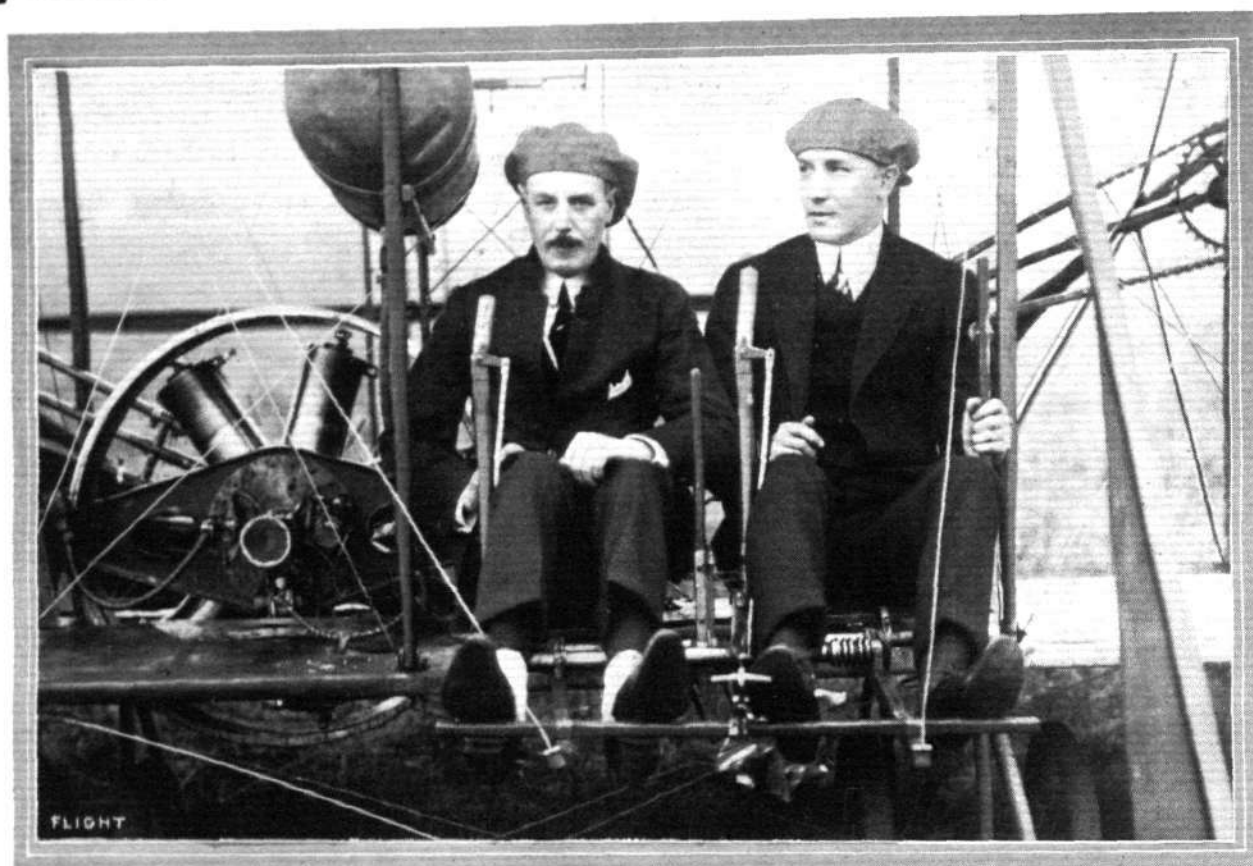
Saulnier monoplane. Manton gave an unintentional demonstration of his skill during one of his flights. He was making a banked turn round No. 1 pylon when the machine side-slipped, and in order to save himself and his passenger he executed a well-judged Chevillard *chute de côté*, and brought the machine to an even keel not so far off the ground.

Some interest was caused in the evening by the arrival of six members of the Press Association, who had walked from Brighton to Westminster (Big Ben), having completed their journey in 18 hours, which, all considered, compares very favourably with the time taken per aeroplane. In this case, however, most of the travellers suffered from "hot feet." On their arrival at the aerodrome (by motor cars) they were received at the Press Club by



A "plan view" from beneath of Beatty, on his Wright, during one of his banked turns at Hendon.

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Captain Tyrer, who probably holds the record for passenger flights in various aeroplanes, starting for a flight at Hendon with Mr. Beatty in his Wright flyer. Note the position of the Gyro motor.

Mr. Charles Lane, the aerodrome's affable representative, and several of their colleagues, after which they "made their way" to the Committee enclosure—where they were presented to Mr. and Mrs. R. T. Gates.

Mr. Gates made a few complimentary remarks on behalf of the Grahame-White Co., and Mrs. Gates presented medals (given by Sir Thomas Lipton) and a silver plaque (awarded by the Grahame-White Co.).

## QUESTIONS IN PARLIAMENT.

In the House of Commons on Tuesday, Mr. Hunt and Lord Charles Beresford addressed questions to the Secretary for War asking whether a foreign aviator received permission to fly down the Thames, although an Englishman was refused the same permission; and whether, seeing that the Aerial Navigation Act was originally intended to preclude foreign aviators from flying over certain localities in England, he would explain why British aviators should be prevented from having that continual practice which was necessary for adequate training.

Mr. McKenna (Home Secretary), who replied, said: The Home Secretary grants the exemptions, though he can do so only on the recommendation of the Admiralty or War Office. I presume both questions refer to the cases of M. Levasseur and Mr. Grahame-White. M. Levasseur flew over the prohibited areas on the Thames without an exemption, and was prosecuted for the offence. Afterwards, on his making a proper application, he was allowed to return to France under an exemption which was subject to special conditions prescribed by the War Office. Mr. Grahame-White, when he came over from France, failed to make any proper application for an exemption. A telephone message sent at the last moment by his London manager gave no particulars on which an exemption could be given. A few days later, when he applied to

the Home Office for an exemption, giving proper notice and reasonable grounds for the application, the exemption was at once granted.

Mr. Fell asked the Secretary for War what was the object of the regulations to prevent flying in hydroplanes over the estuary of the Thames and round the coast; if he was aware that these regulations were a serious blow to the aeroplane and waterplane industry; and whether it was proposed to withdraw or amend them shortly.

Mr. Tennant: The answer to the first part of the question is that the regulations and orders made by the Home Office prohibit flight over certain areas constituting a small portion of the coast line in the interests of national safety. The reply to the second and third parts of the question is in the negative.

On Wednesday the Marquess of Tullibardine asked what progress had been made in departmentalising aeronautics at the War Office.

Col. Seely (Secretary for War): In view of the increasing importance of this branch of the Army I am now in communication with the Treasury with regard to the establishment of a separate department at the War Office to administer the Army Air Service. The head of this department will be Brig.-Gen. Henderson, who is a certificated pilot. He will be Director-General, and will have direct control over all parts of this service.

## Shoreham's Awakening.

A NEW innovation has been made at the Brighton-Shoreham Aerodrome in the form of a weekly meeting, and although machines are limited in number, comparatively speaking, some excellent flying is to be seen. Mr. Eric Pashley provides the spectators, regardless of wind, with some good exhibitions, and on Sunday last he took up several passengers, including Mr. White and Mr. Trusler. The weather was ideal, and before sunset Mr. Pashley, with Mr. Clarence Winchester in the passenger's seat, treated the assembly to a remarkable exhibition of trick flying. The sharp banked turns and spirals were especially clever, and it is surprising

what Mr. Pashley's 'bus can do, given fair weather. It is interesting to note that the first *brevet* to be taken at Shoreham was secured by Herr Hans Rolshoven on Monday evening, when this pilot did exceptionally well, particularly so in the landing tests. He accomplished his "eights" at a height of 400 ft. Three Breguet machines are now expected.

## Acknowledgments.

IN the article on the Avro waterplane which appeared in our last issue it should have been stated that two of the photographs were taken by Mr. F. Rowe of Shoreham, who makes a speciality of taking photographs at the Brighton-Shoreham aerodrome.



# The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

## Committee Meeting.

A MEETING of the Committee was held on Tuesday, the 15th inst., when there were present: The Marquess of Tullibardine, M.V.O., D.S.O., M.P. (in the Chair), Mr. Griffith Brewer, Mr. Ernest C. Bucknall, Mr. G. B. Cockburn, Mr. John Dunville, Prof. A. K. Huntington, Mr. J. T. C. Moore-Brabazon, Mr. Alec Ogilvie, Mr. C. F. Pollock, Mr. A. Mortimer Singer, Mr. T. O. M. Sopwith, Mr. R. W. Wallace, K.C., and the Secretary.

Mr. Roger W. Wallace, on behalf of the Committee, extended a welcome to Lord Tullibardine, the new Chairman of the Club, on his taking the Chair for the first time.

**New Members.**—The following new members were elected:—Lieut. P. A. Broder, Lieut. Ronald Burns, Robert J. Cooke, Lieut.-Col. A. B. Hamilton, Lieut. E. O. Priestley, R.N., Capt. F. W. Richey, R.A., Capt. C. E. Risk, R.M.L.I., Sydney V. Sippe, and Dr. Ernest Stratford.

**Temporary Honorary Membership.**—Lieut. A. Stelling, of the Parseval Airship Co.

**Aviators' Certificates.**—The following Aviators' Certificates were granted:—

No.	Date.	
533	June 25, 1913	Lieut. Augustus Willington Shelton Agar, R.N. (Short Biplane, Central Flying School, Upavon).
534	July 1, 1913	Lieut. Arnold John Miley, R.N. (Bristol Biplane, Bristol School, Salisbury Plain).
535	July 1, 1913	2nd Lieut. Ronald Falshaw Morkill (Special Reserve) (E.A.C. Biplane, Eastbourne Aviation Co., Eastbourne).
536	July 1, 1913	Lieut. Edward Osmond, R.N. (Bristol Biplane, Bristol School, Salisbury Plain).
537	July 1, 1913	William Thomas Warren (Caudron Biplane, Ewen School, Hendon).
538	July 2, 1913	1st Class Air-Mechanic Henry Vaughan Jerrard (B.E. 201, Royal Flying Corps, Netheravon).
539	July 2, 1913	Capt. Arthur Charles Barnby, R.M.L.I. (Bristol Biplane, Bristol School, Salisbury Plain).
540	July 2, 1913	Lieut. Richard Edward Orton (1st East Lancashire Regt.) (Bristol Biplane, Bristol School, Salisbury Plain).
541	July 3, 1913	1st Class Air-Mechanic Frank Pratt (Bristol Biplane, Royal Flying Corps, Lark Hill).
542	July 4, 1913	Lieut. Constantin Beroniade (Roumanian Subject) (Bristol Monoplane, Bristol School, Salisbury Plain).
543	July 4, 1913	Lieut. Alexandru Pascanu (Roumanian Subject) (Bristol Monoplane, Bristol School, Salisbury Plain).
544	July 8, 1913	Thomas Wilfrid Elsdon (Vickers Biplane, Vickers School, Brooklands).
545	July 8, 1913	Graham Ellesmere Harris (Bristol Biplane, Bristol School, Brooklands).
546	July 8, 1913	Sir Archibald Henry Macdonald Sinclair, Bart. (Grahame-White Biplane, Grahame-White School, Hendon).
547	July 8, 1913	2nd Lieut. Albert Ernest Morgan (Special Reserve) (Bristol Biplane, Bristol School, Brooklands).
548	July 8, 1913	Lieut. Arthur Courtney Boddam-Whetham (Reserve of Officers) (Grahame-White Biplane, Grahame-White School, Hendon).
549	July 9, 1913	Sergt. Edward Ernest Porter (Maurice Farman Biplane, Central Flying School, Upavon).
550	July 10, 1913	Lieut. Maurice John Ambler (14th Hussars) (Caudron Biplane, Temple School, Hendon).
551	July 10, 1913	Lieut. Henry Le Marchant Brock (Royal Warwickshire Regt.) (Deperdussin Monoplane, Deperdussin School, Hendon).
552	July 11, 1913	Willoughby Montgomery Fane Pendlebury (Bristol Biplane, Bristol School, Brooklands).

553 July 11, 1913 2nd Lieut. John Hugh Macdonald Stevenson (Bristol Biplane, Bristol School, Salisbury Plain).

554 July 12, 1913 Shipwright Charles Barry Snow (Short Biplane, Naval School, Eastchurch).

555 July 14, 1913 Herbert Bradford (Short Biplane, Naval School, Eastchurch).

556 July 14, 1913 Hubert Poyntz-Gaynor Leigh (Short Biplane, Naval School, Eastchurch).

557 July 14, 1913 George Alfred John Blundell (Short Biplane, Naval School, Eastchurch).

The following Certificates were taken in France:—  
Lieut. Wilfrid Rhodes Freeman.  
Stephen Douglas.

**Public Safety and Accidents Investigation Committee.**—On the motion of Mr. G. B. Cockburn, the report on the fatal accident to Mr. Richard Norton Wight was unanimously adopted.

(Full report will be found under these notices.)

**Mortimer Singer £500 Prize.**—The Committee, after examining the Observer's Report and Certificates relating to the aircraft, unanimously awarded the Prize of £500 to Mr. T. O. M. Sopwith, the entrant of the aircraft.

(Details of the performance of Mr. H. G. Hawker on the Sopwith Biplane will be found in these notices.)

**"Daily Mail" £5,000 Prize: Circuit of Great Britain.**—The Chairman reported that he had accompanied Col. Seely, the Secretary of State for War, and General Henderson of the War Office, to Southampton on Monday last, for the purpose of coming to some satisfactory arrangement in connection with the *Daily Mail* Circuit of Great Britain Race. He was pleased to say that the War Office had promised every facility for the starting of the race from Southampton Water, and that the regulations affecting some prohibited areas on the route would be rescinded altogether, and in other cases relaxed as far as the *Daily Mail* race is concerned.

A unanimous vote of thanks was passed to the War Office for the facilities extended to the Club, and to Lord Tullibardine for the trouble he had taken in arranging the matter.

## Royal Aero Club General Committee.

A meeting of the Royal Aero Club General Committee was held at the Royal Aero Club, 166, Piccadilly, London, W., on Tuesday, the 15th inst., when there were present:—

Mr. Roger W. Wallace, K.C., in the Chair.

*Royal Aero Club*—Mr. Griffith Brewer, Mr. Ernest C. Bucknall, and Mr. G. B. Cockburn.

*Aero Club of Ireland*—Mr. John Dunville.

*Bristol and West of England Aero Club*—Mr. A. E. Catford and Mr. T. W. Egerton.

*Scottish Aeronautical Society*—Mr. J. Allison, Jun., and Prof. Sir J. H. Biles.

Harold E. Perrin, Secretary.

Apologies for absence were received from the Dover Aero Club, Yorkshire Aero Club, and the East Riding Aero Club.

**F.A.I. Conferences.**—The Chairman reported on the recent Conference held at Brussels dealing with the law of the air. The following delegates were appointed to attend the Conference at The Hague at the end of this month:—Mr. R. W. Wallace, K.C., and Mr. Griffith Brewer.

**Finance.**—The Financial Statement for the year, showing a balance in hand of £14 4s. 1d., was submitted and adopted.

The Finance Committee for the current year was appointed as follows:—Mr. R. W. Wallace and Mr. E. C. Bucknall for the Royal Aero Club, Mr. John Dunville for the Aero Club of Ireland, Mr. A. E. Catford for the Bristol and West of England Aero Club, and Mr. J. Allison, Jun., for the Scottish Aeronautical Society.

## Daily Mail £5,000 Prize: Circuit of Great Britain.

The entries for this Contest closed on Wednesday last, and at the time of going to Press the following have been received:—

T. O. M. Sopwith	James Radley
S. F. Cody	F. K. McClean

The Race will start on August 16th, from Southampton Water, and the necessary arrangements are now being made. In order to reach the English Channel from Southampton Water, certain prohibited areas extending from Portsmouth to the Isle of Wight have to be passed through, and the War Office, for the purposes of this race, have kindly granted exemptions. After starting

from Southampton Water, the competitors will pass between two Lightships off Calshot and proceed direct to the centre fort at Spithead, which must be passed at a distance of not more than 400 yards either side and at a height not exceeding 300 ft. The prohibited area at Dover, which extends for 3 miles out to sea, is to be passed at not less than 800 yards from the Admiralty Pier. It is not proposed to have a control at Dover, but Walmer or Ramsgate may be utilised for this purpose. The prohibited areas at Newhaven and Montrose will not be prohibited to competitors in the race.

On the return to Southampton Water, the competitors will pass south of the Isle of Wight and turn at the Nab Lightship, proceed to the centre fort at Spithead, and thence to Southampton Water.

## Mortimer Singer £500 Prize.

The £500 Prize kindly put up for competition by Mr. A. Mortimer Singer, has been awarded to Mr. T. O. M. Sopwith, the entrant of the Sopwith Biplane, which successfully accomplished the tests laid down in the rules. Mr. H. G. Hawker was the pilot of the aircraft, and the course was from a point on the land off Southampton Water to a point in the Solent, 5 miles away. Six out and home flights had to be made, alighting on arrival at each point. In each flight an altitude of at least 750 ft. had to be attained, and on one occasion during the tests an altitude of 1,500 ft. The time allowed for the carrying out of the tests was 5 hrs., but Mr. Hawker completed in 3 hrs. 25 mins.

The following is the specification relating to the all-British aircraft used by Mr. Hawker:—

Sopwith Biplane; Motor, 100 h.p. Green; Carburettor, Zenith; Magneto, British Bosch; Sparking Plugs, British Bosch; Propeller, Lang.

In addition to the Prize of £500 to Mr. Sopwith, Mr. A. Mortimer Singer is kindly presenting Mr. H. G. Hawker with a souvenir.

## Hurlingham Balloon Race.

The last Balloon Race for the present season started from Hurlingham on Saturday last. It was a long-distance race for the Hedges Butler Challenge Cup, and was won by Mrs. John Dunville for the second year in succession. Mrs. Dunville used the "Banshee," and the pilot was Mr. C. F. Pollock. In addition to the Challenge Trophy, Mrs. Dunville will receive a souvenir from Mr. Frank Hedges Butler.

The following are the approximate distances accomplished by the competitors:—

1. Banshee... (Mrs. John Dunville). Pilot, Mr. C. F. Pollock; landed at Edingthorpe. Distance 120 miles.
2. Planet ... Pilot, Mr. A. Mortimer Singer; landed at West Caister. Distance 118 miles.
3. Polo ... Pilot, Mr. John Dunville; landed at Shotesham St. Mary. Distance 98 miles.
4. R.F.C. ... Pilot, Major E. M. Maitland; landed at Great Yeldham. Distance 68 miles.
5. Mascot ... Pilot, Mr. A. P. Hohler; landed at Gestingthorpe. Distance 65 miles.

## Ballooning.

Sir Claude Champion de Crespigny, Bart., has kindly offered to present a trophy, the "Champion Lodge Cup," to any Member of the Club who in a balloon trip lands within 5 miles of the pond situated a quarter of a mile S.S.W. of Champion Lodge, Maldon, Essex. The Ascent must have been made from a place not less than 30 miles distant from Maldon. No formal entry or notice of intention to compete is necessary. Members on landing are requested to immediately notify Sir Claude Champion de Crespigny, Bart., Champion Lodge, Maldon, Essex.

## ACCIDENTS INVESTIGATION COMMITTEE OF THE ROYAL AERO CLUB.

### REPORT No. 15.

REPORT ON THE FATAL ACCIDENT TO MR. RICHARD NORTON WIGHT, WHEN FLYING AT SHOREHAM, ON SUNDAY, JUNE 29TH, 1913, AT ABOUT 6.15 P.M.

**Brief Description of the Accident.**—Mr. Richard Norton Wight was flying an Avro Tractor Biplane fitted with a 60 h.p. E.N.V. motor, at the Shoreham Aerodrome, on Sunday, June 29th, 1913, at about 6.15 p.m. The aircraft started northwards against the wind, made a half-circuit over the Aerodrome, and then crossed the railway embankment which borders the Aerodrome, at a height of about 100 ft. Shortly after crossing the railway line, the aircraft made a sharp left-hand turn as if to return to the Aerodrome. This turn developed into a sideslip followed by a nose-dive to the ground. The shock of the impact with the ground broke the petrol connections between the tank and the motor. The petrol escaped on to the motor, which was still running, and burst into flames, which spread along the fuselage. The pilot endeavoured to extricate himself, but one of his feet became entangled with a wire, and he fell head downwards. By the time he was freed he was badly burnt, and died in the hospital about five hours afterwards.

Mr. Richard Norton Wight was granted his Aviator's Certificate, No. 462, on April 22nd, 1913, by the Royal Aero Club.

**Report.**—The Committee sat on Monday, July 7th, 1913, and heard the evidence of several eye-witnesses. Mr. H. V. Roe, of Messrs. A. V. Roe and Co., the designers and manufacturers of the aircraft, attended and gave evidence on various points raised by the Committee.

From the consideration of this evidence, the Committee regards the following facts as clearly established:—

- (1) The aircraft was built by Messrs. A. V. Roe and Co., in Manchester, in August, 1911.

- (2) The wind at the time of the accident was estimated at about 12 miles per hour.

- (3) The flight lasted less than 5 mins., and during the whole time the aircraft was flying tail down.

- (4) The motor was so overloaded by an unsuitable propeller that its speed was 100 revolutions per minute below the normal.

- (5) The pilot was not apparently injured by the fall, but lost his life from the effects of the fire.

- (6) The fire originated subsequent to the fall, and was the result and not the cause of the accident.

- (7) The various controls were intact.

**Opinion.**—The Committee is of opinion that the cause of the accident was an error of judgment on the part of the pilot, who, contrary to the advice of the pilot in charge, attempted an extended flight instead of a straight flight down the aerodrome. The pilot in charge, who had just previously made some straight flights, warned him that the aircraft was not flying strongly enough for a circuit. The Committee is satisfied that the aviators and mechanics who were at the aerodrome at the time, ran to the spot as quickly as possible and took great risks in removing the pilot from the flames, but from the evidence given it appears that if the spectators who were in the immediate vicinity at the time of the accident had been able to render prompt assistance, the pilot's life might have been saved.

**Recommendation.**—As this is the fourth accident which has been reported on by the Committee, which has occurred owing to pilots persisting in flying with aircraft developing insufficient power to give them their safe flying speeds, the Committee hopes that those responsible will take such measures as may be possible to prevent pilots risking themselves in this unnecessary manner.

166, Piccadilly, W.

HAROLD E. PERRIN, Secretary.

## THE ROYAL FLYING CORPS.

The following appointment was announced by the Admiralty on the 13th inst.:—

Lieut. R. B. Davies, to the "Hermes," additional, as Flight Commander for Naval Flying School, Eastchurch, to date July 10th.

The following appointment was announced in the *London Gazette* of the 15th inst.:—

Second Lieut. Robert R. Smith-Barry, Special Reserve, from Flying Officer, is appointed to the Reserve. Dated June 2nd, 1913.

## ROYAL FLYING CORPS (MILITARY WING).

WAR OFFICE summary of work for week ending July 11th:—

**No. 1 (Airship) Squadron, Farnborough.**—On the 5th, 7th, 8th, and 9th the "Beta" carried out a large number of training and reconnaissance flights, including the observation of troops and con-

veyance of messages. On the 9th, the "Beta" and "Delta" were deflated. A number of "Free" Balloon runs were carried out.

**No. 2 Squadron, Montrose.**—A large number of flights were carried out by the pilots of this squadron, including the training of N.C.O.'s. as pilots. The distance covered during the week was 1,170 miles.

**No. 3 Squadron, Netheravon.**—A large number of cross-country and reconnaissance flights were carried out by the Officer pilots of this squadron. The detachment at Lydd were busily engaged in the observation of artillery fire.

**No. 4 Squadron, Netheravon.**—During the week, the Officer and N.C.O. pilots made a number of reconnaissance and training flights, in conjunction with troops.

**Flying Depot, Farnborough.**—Experimental work was continued on the M. and H. Farman machines.



## TESTS ON WING SPARS.

By ALEC OGILVIE.

[In consequence of the uncertainty that exists respecting the nature and magnitude of the stresses in the wing spars of aeroplanes, which has been the subject of very much discussion of late, Mr. Alec Ogilvie has carried out at his shed at Eastchurch a series of practical tests, the result of which he has communicated to us without delay, so that they may be immediately published for the benefit of all concerned.—ED.]

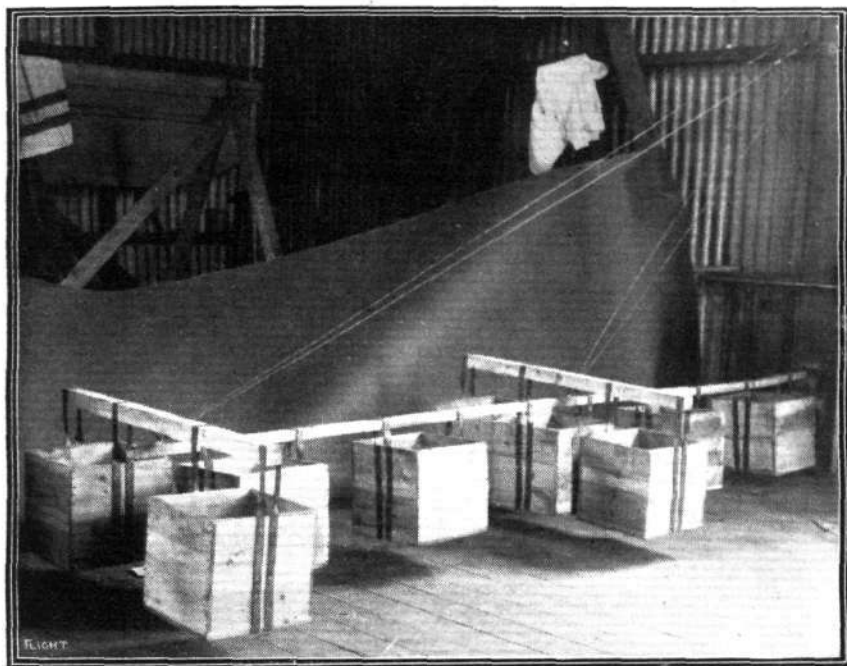
The object of these tests was to determine the relative strengths of variously sectioned wing spars under a loading similar to that experienced in flight.

As the stresses are more severe in the case of the upper rear spar than in any other spar of a biplane, this particular member was

By the theorem of three moments, the thrust,  $P_1$ , in the strut, B E, is found to be 36 lbs. under normal conditions of flight at 42 m.p.h.

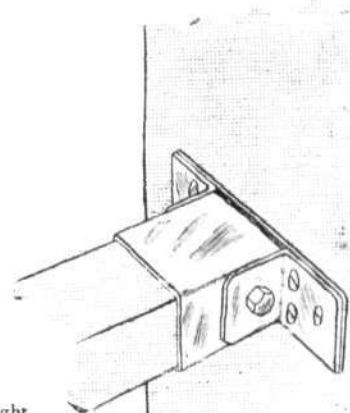
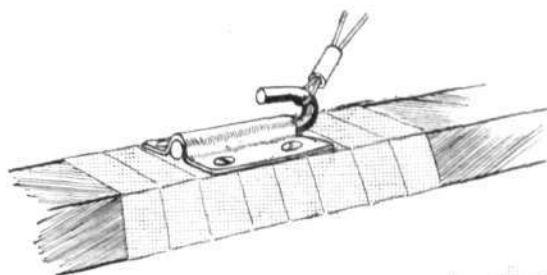
Similarly the thrust,  $P_2$ , in the strut, F C, is 30.5 lbs.

The upper rear spar, D E F, is a uniformly-loaded continuous



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Photograph illustrating the spar testing apparatus employed by Mr. Alec Ogilvie at his shed at Eastchurch. The spar is rigged up to represent the upper rear spar of a biplane. Load is applied by bricks carried in boxes, which are hung on to the spar by steel straps, spaced apart at distances corresponding to the wing ribs. The load due to the lower plane, which is transmitted through the struts, is applied locally by the transverse beams that carry the extra boxes.



"Flight" Copyright.

Sketch illustrating the attachment of the shoulder of the spar to the upright in the wall of the shed; also the hook attachment of the wire support to the spar. Both attachments are standard fittings as used on the Wright biplane.

used for the tests. The wing structure in question is that employed on the Wright biplane.

The loads imposed by the lower wing are calculated as follows:—

Total weight of machine fully loaded, with pilot, passenger, and five hours' fuel	1,550 lbs.
Weight of wings	250 "
Difference producing stress	1,300 "
Wing span	40 ft.
Normal flight speed	42 m.p.h.
Speed range	40-50 "

Under the normal conditions of flight at 42 m.p.h., the distribution of wing pressure is such that the centre of pressure is situated 0.36 of the chord from the leading edge. The rear spar thus carries 58 per cent. of the load on the wing.

In a biplane, the upper plane carries more than half the load. It is here assumed that it carries 55 per cent. of the load. Thus, for the purposes of calculation the upper plane carries 715 lbs. of the 1,300 lbs. in flight.

Of this 715 lbs., the rear spar carries 58 per cent. in normal flight at 42 m.p.h., which on a span of 40 ft. represents a distributed load of 10.3 lbs. per foot run.

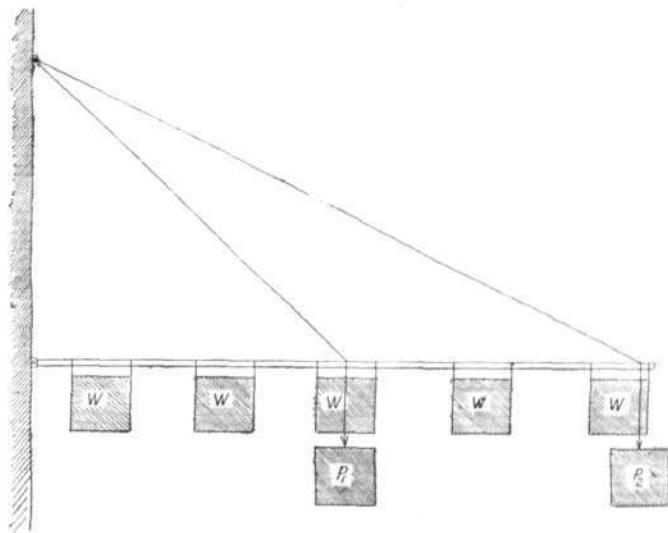
At 60 m.p.h., which might conceivably be attained during an excessive dive, the distribution of pressure over the wing section is such that the c.p. lies 0.505 of the chord from the front edge, so that the rear spar carries 83.5 per cent. of the load on the wing. Calculated for the upper wing on the previous assumption, this corresponds to a distributed load of 14.8 lbs. per foot run.

A diagram of the bracing of the warping portions of the upper and lower rear spars of the Wright biplane is shown in Fig. 1.

The lower spar, A, B, C, is a uniformly-loaded continuous girder, supported at the three points, A, B, C, by the wing hinge at A, and by the strut thrusts at B and C.

girder, supported at the three points, D, E, and F, by the wires, A E and A F, with additional loads due to the forces,  $P_1$  and  $P_2$ , applied at E and F.

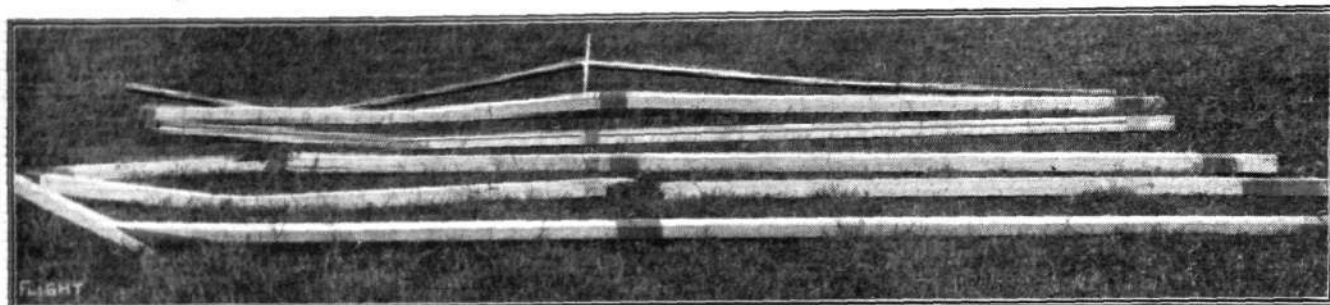
Owing to the compression set up in the spars by the oblique pull of the bracing wires, T1 and T2, very considerable difficulty is found



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Diagram illustrating the application of the load in the testing apparatus.





Photograph of the fractured spars laid out on the grass after the tests.

"Flight" Copyright.

in actually determining the stresses, because the theorem of three moments no longer applies.

In order, therefore, to determine experimentally the strength of various spars, they were erected one after the other with the usual system of hooks and hinges employed in the Wright biplane construction.

Loading in the form of bricks carried in boxes hung by straps spaced apart by distances corresponding to the ribs in the wing, was employed to stress the spars. Extra boxes were hung on at the fittings to represent the calculated strut thrusts. The arrangement is illustrated by the sketch in Fig. 2.

The boxes represented a load of nearly 4 lbs. per foot run, and one brick per box represented an added load of nearly 3 lbs. per foot run. The bricks were put in the boxes one or two at a time until the spar broke.

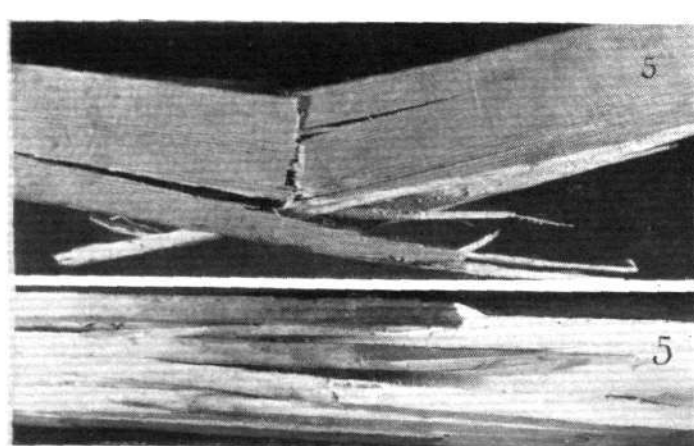
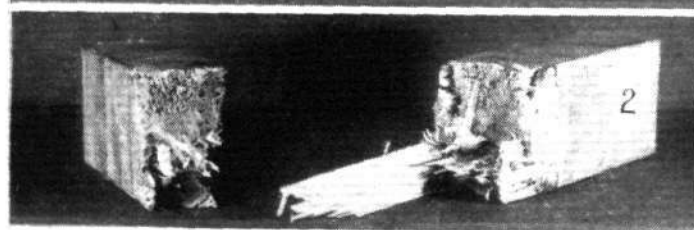
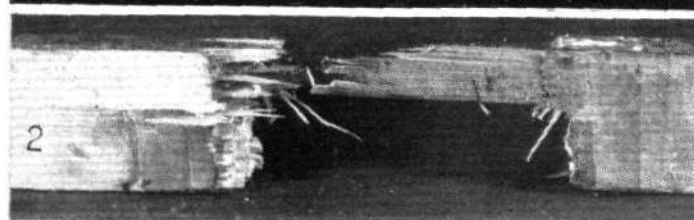
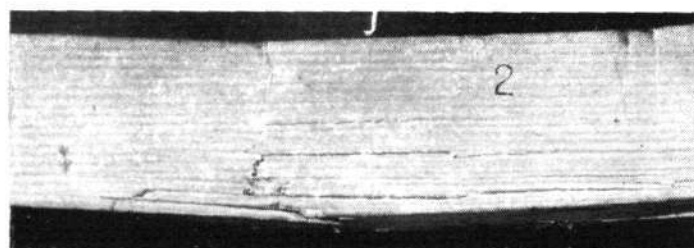
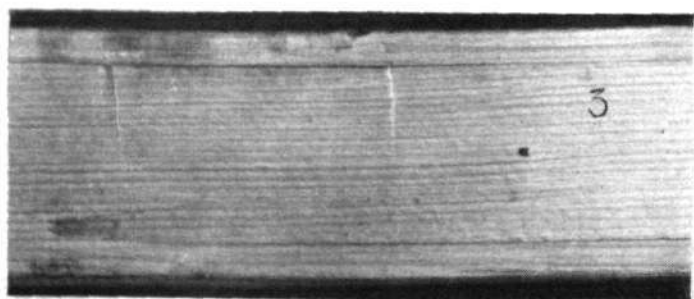
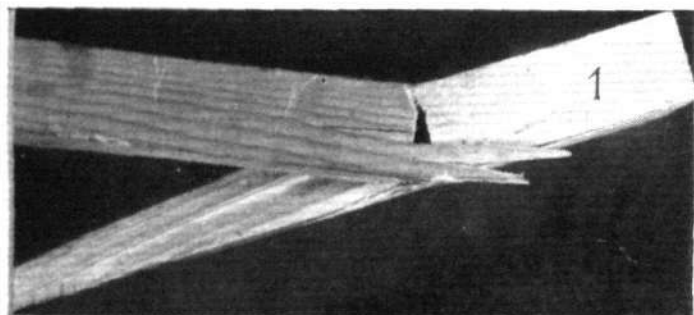
Measurements of the deflection of the spars in each bay were made after the addition of each four bricks, until the spar was very close to its breaking point.

In one or two cases the load was taken off, when the spar was nearly at the breaking point, and measurements were made of the permanent set in the spar.

It was found that the spar, after being deflected as much as 2 inches in the centre of a length of 5 ft. 8 ins., would recover perfect straightness within a few 100ths of an inch. This clearly showed that the elastic limit of the wood had not been reached.

Moreover, in almost all cases, the broken pieces of the spar were straight, thus indicating that the elastic limit is very close to the ultimate strength.

Six different sections were tested, five being constructed of wood, and one being a steel tube.



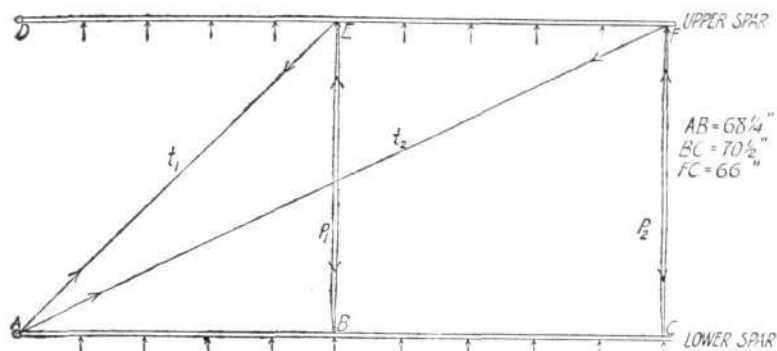
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Fractures of the various spars tested.—Spar No. 1, broke downwards as a beam. Spar No. 2: The upper view shows the fracture, which broke in the inner bay as a beam; the lower views show the fracture that occurred in the same spar at the screw holes of the hook fitting. The two lower photographs are complementary views of the same fracture; it is probable that this lower fracture was the primary failure of the beam. Spar No. 3 showed weakness in the glued joint and also in torsion. Spar No. 4 gave the best results. Spar No. 5: The upper photograph is a view looking down on the fracture, which failed laterally as a strut; the lower view is a side view of the fracture. This spar is an L-section beam.

All the wooden spars were made of white spruce.

The elastic coefficient for each spar is given in the table: it was measured by the deflection of each spar under a single central load.

Spars No. 1 and 2 are the actual back and front spars of the Wright biplane, and are, of course, easy to construct.



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Diagram of the bracing system of the warping portion of the Wright biplane, which was used as a basis for the test.

Spar No. 3 was difficult to construct because the glue on such a long length gets cold before the nails can be driven in.

Spar No. 4 is of the Maurice Farman type. Its halves are joined up with a fillet of hard wood. It will be observed that, although expensive to make, it gave very satisfactory results under test.

Spar No. 5 is easily made with a spindle machine, but when tested shows up as being rather weak laterally.

Spar No. 6 is a mild steel tube measuring 1.25 inches in outside diameter. Its section is 19 gauge; it is solid drawn and unannealed.

The breakages were particularly interesting, and the accompanying photographs show up the weaknesses of the spars very clearly.

Spar No. 1 broke downwards as a beam in the inner bay. It was obviously at the point of fracture also at the hook joint. There was twice as much deflection in the inner as in the outer bay.

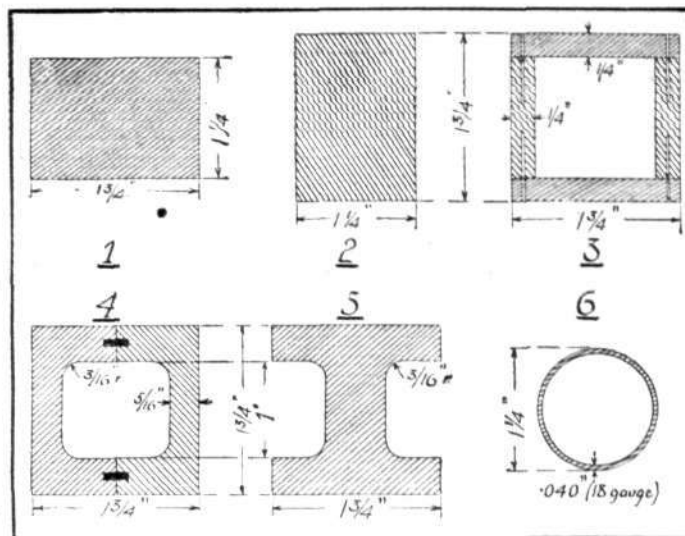
Spar No. 2 broke in the inner bay as a beam. It also broke at the screw holes of the hook fitting. This was probably because the screw holes cut into too large a proportion of the fibres of the spar.

Spar No. 3 showed weakness in the glued joint. It was also weak against torsion, and twisted at the inner hook fixing through an angle of approximately 30° just before fracture. The fine nails used weakened the side members, as is shown by the failure in compression at each nail.

Spar No. 4 is undoubtedly the best spar of the series. It failed as a beam in the inner bay.

Spar No. 5 is too weak sideways, and the failure occurred in the inner bay by the lateral collapse of the spar as a strut. This was not altogether unexpected, as the low lateral moment of inertia for this spar is very noticeable. It was also apparent from the fracture that a larger radius in the channels would have been an improvement.

Spar No. 6 failed as a beam in the inner bay. The objection to this spar is that it is rather heavy.



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Sections of the spars tested by Mr. Alec Ogilvie at Eastchurch.

TABLE I.—Strength.

No.	Weight, lbs./ft. run.	Elasticity mil. lbs./sq. in.	Principal moment of inertia. (inches) <sup>4</sup> .	Lateral moment of inertia. (inches) <sup>4</sup> .	EI, mil. lbs. sq. ins.	EI', mil. lbs. sq. ins.	Gross sectional area, sq. in.	L. Loading carried, lbs./ft. run.	L/W
1	.485	1.94	.285	.558	.554	1.08	2.19	62.3	128
2	.495	2.02	.558	.285	1.13	.575	2.19	104.0	210
3	.354	1.79	.577	.577	1.03	1.03	1.50	60.2	170
4	.405	1.21	.697	.672	.84	.81	1.94	90.3	223
5	.400	1.65	.697	.356	1.15	.59	1.94	83.9	210
6	.517	25.1	.0307	.0307	.77	.77	.157	69.9	135

The units for columns EI' and EI are "millions of pound square inches."

TABLE II.—Deflections.

No.	Inner Bay. Maximum deflection in inches in each span at loadings in lbs. per ft. of				Outer Bay. Maximum deflection in inches in each span at loadings in lbs. per ft. of			
	15.6	26.1	36.6	47.2	15.6	26.1	36.6	47.2
1	.30	(.70)	1.22	2.18	.37	.66	.85	.94
2	.10	.21	.34	.50	.16	.29	.41	.52
3	.16	.38	.61	.72	.35	(.53)	.70	.80
4	.18	.32	.50	.72	.30	.48	(.65)	.80
5	.13	.24	.35	.49	(.18)	.30	.44	.57
6	.10	.24	.51	.90	(.30)	.50	.67	.85

The bracketed deflections were interpolated.

## AIRSHIP NEWS.

### A Nocturnal Trip by "LI."

ON the 9th inst., the Zeppelin naval dirigible "LI" left her hangar at Johannisthal at 11 p.m., and, after cruising in the direction of Potsdam and Jueterbog, arrived back at her hangar at 6.28 the next morning.

### Three-Hour Trip by "Adjutant Rean."

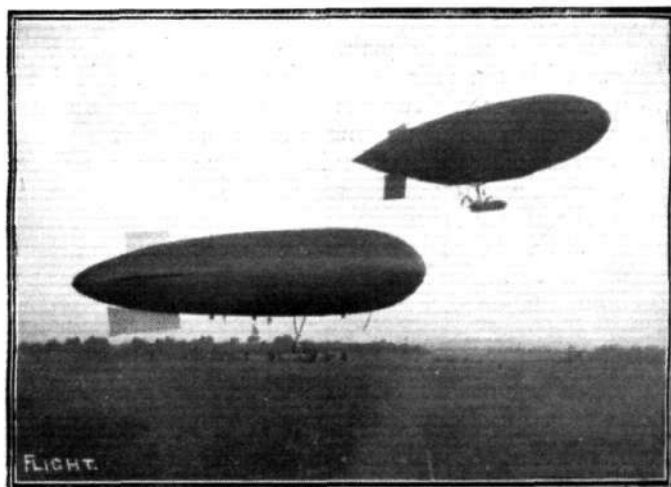
FOR the training of officers the Astra dirigible "Adjutant Rean" made a voyage of three hours over the neighbourhood of Verdun on the 9th inst.

### Two New Italian Dirigibles.

TESTS are now being carried out over Lake Bracciano with two new dirigibles belonging to the Italian Army. One vessel is characterised by a speed which is only just under 80 miles an hour, while the other is fitted with a special platform for accommodating quick-firing guns.

### Mishap with the Veeh Airship.

ON its second trial, on the 11th inst., the Veeh airship, which is now designated VI, after following the Rhine from Dusseldorf, had to make a landing at Oberembt, owing to the fact that the steering-gear refused to act. Eventually the dirigible was dismantled, and sent back to Dusseldorf for repairs.



The Royal Flying Corps Parseval airship and the "Beta" on Farnborough Common together last week, after a cruise.



# **ARMCHAIR REFLECTIONS.**

By THE DREAMER.

## **Diplomacy.**

I AM quite sure I should never do for a Member of Parliament, leaving out of the question a Cabinet Minister: I am not well enough up in that subtle art known as diplomacy. Perhaps I was brought up in a rough school, but at any rate, when my father asked me whether I had been to school or been fishing, I had to answer in plain English. Had I been versed in the gentle art I should probably have replied: I have to answer the hon. member of this family in the affirmative; but to which side of the issue this is to be applied, I am not at the moment, for obvious reasons, able to say. In accordance with the customs and standing orders of this house, I proceeded to the place in question, but until I have the report of the schoolmaster, I do not think it wise, in the interests of peace, to give a definite reply, and would ask the hon. member to delay his question for twenty-four hours, when I shall no doubt be in a position to answer it to his and my own satisfaction.

Interest, is a word that can be used quite correctly, with more than one meaning. It may mean money in return for the use of capital. It is also used to denote whether one is concerned about certain things. It may also be used in the third person, and in such a way that it is not quite clear whether it means money or concern, or both, or neither. Mr. Wing: "Has any member of this House been invited to see these aeroplanes?" Col. Seely: "I have invited two hon. members, and, indeed, I invited all of them to see what could be seen without detriment to the public interest." Now I, as I said before, not being well up in diplomacy, am not at all sure what "interest" in this case means. I take it that "public" means all and sundry—or, to bring it to the unit for the sake of simplicity of argument, me. Having got it to the simple state of Col. Seely and myself, perhaps I may now try to get a little light on the subject. Does Col. Seely mean that if the hon. member or members saw all there was to be seen in the way of aeroplanes, it would be detrimental to my interest (value) as to what I was getting for my share of capital expended? or does he mean that if they saw all the aeroplanes we possess, it would be so many that it would be detrimental to my interest (concern), and that I should not want to help to buy more? I really think Col. Seely is treating me with too much consideration in shielding my tender person from the things that it is not good for me to know. I don't want to be shielded. The ostrich method of defence does not appeal to me at all. I want to know how things stand in plain English: yes or no. My "interest" is the protection of these shores, and I am ready to pay for it. A short time ago there was a little argument between Mr. Joynson-Hicks and Col. Seely, as to whether the Colonel could produce eighty efficient aeroplanes, and it came to a little sporting event. Col. Seely said he could, and invited his opponent to go round and count them for himself. Mr. Joynson-Hicks said he would, and if he were wrong would apologise. I got quite interested, and as the days went on, and the daily papers reported how many had been counted day by day, I felt that at last I should know, and began to speculate in my own mind as to who would prove right. This is now some little time ago, and now Col. Seely says he does not know whether Mr. Joynson-Hicks has been right round or not, and Mr. Joynson-Hicks says he has been right round, but that Col. Seely has asked and

received his assurance not to make public any information he may have become possessed of, except by such statements to Parliament as he may think necessary. Now I do not understand this, because it is diplomacy, and I only understand plain, straightforward English. No, I am afraid I shall never represent England at one of the foreign legations.

## **The Problem Solved (Once More).**

In writing last week of Mr. Parsons' claim to have solved the problem of aerial navigation, I said he might, for all I know, have something up his sleeve of great importance to aeronautics. A reader of *FLIGHT* sends me a cutting from *The Western Daily Mercury*, which once more shows how great minds sometimes get into the same train of thought. The cutting is in the form of a letter to the *Mercury* and is reprinted by them. In it their correspondent says, "Sir,—In commenting upon the remarks of your Naval and Military correspondent, in to-day's *Mercury*, . . . . With reference to his notes upon air concussion, I suppose I shall raise another storm among the quidnuncs by stating that airmen may have no fear of the effects of air concussion or any form of atmospheric disturbance, from whatsoever cause, if they were aloft in a safety aeroplane, of which I have full working (scale) drawings and all constructional details. There would be no need for airmen to worry about the rapid manipulation of their *ailerons*, &c., as I have discovered a method which ensures not only automatic equilibrium and the prevention of the usually fatal 'side-slip' but also an absolutely safe method of landing on *terra firma*, should any serious accident occur to the machine whilst at a high altitude."

Now here we have two men, in widely-separated parts of this country, who between them should evolve something worth having. Mr. Parsons of Hull says he has got (or will have) a machine that will rise vertically from the ground and descend the same way, and moreover can be navigated, and that without the usual planes, and Mr. Tozer of Plymouth has got scale drawings and all constructional details of another wonderful machine, which has apparently got the few things that the other lacks. I think it is positively wicked that two great men like these should be allowed to hide their respective lights under a bushel. Surely in this rich country there is money to be found somewhere; and as Mr. Tozer says, "All this would give airmen the greatest confidence in their machines, and, further, its adoption would create a new and highly profitable industry." Now, then, here is a chance for somebody to help two clever men, assist aviation, and make a bit for themselves. I would entertain the idea myself, but I promised to raise my hat to Mr. Parsons some day, and now I shall want two hats, and I can't afford everything.

## **Seeing Most of the Game.**

There is a saying that, "Those who look on see most of the game." This is as it may be, but there is not much doubt that those who look on at flying and learn a little aerodrome *patois* get quite a fair share of "kudos" in the shape of admiration from the fair sex, to say nothing of introductions leading to invitations to parties and week-end visits. I really believe that a good deal of this kind of thing is simply done to pander to a passion for what is known in the vernacular as "swank," but in some cases it is unfortunately done with the



deliberate intention to deceive, with a motive of gain, other than self-aggrandisement.

I had an instance of this only last week at Hendon. I saw there a lady I knew quite well, who had visited the aerodrome with her mother; and I passed along to speak to them, when I noticed they were in conversation with a gentleman. I stood back a little, waiting till they were disengaged, and although I am not, I hope, an eavesdropper, I could not help catching a word or two that caused me to move closer, and without any feeling of shame listened to his "fairy tales." I think I know most of the pilots within a good few miles of London, with the possible exception of Mr. Fairbairn, and I certainly thought I was about to make his acquaintance. After a moment or two, I was seen, and invited to join the group. As the gentleman still continued his light and airy talk about his "machine down at Brooklands," and as he seemed quite willing to include me in his audience, I felt justified in asking a few discreet questions, with the result that he suddenly remembered a pressing engagement elsewhere.

Another way in which (this time, probably quite

## FROM THE BRITISH

### Brighton-Shoreham Aerodrome.

Tuesday of last week Geere testing for circuits at a height of 300 ft. Shaw, Rolshoven and Elliott afterwards out doing straights. Mr. Eric Pashley out on his H. Farman with his brother as passenger. The following morning early, Geere, Shaw and Rolshoven were up on the 45 Green-Avro, and on Thursday Shaw put up some excellent straights, while Elliott succeeded in getting the rolling 'bus off. Friday morning saw some good work, all the Avro pupils being out. In the evening Rolshoven made several high flights, including eights and circuits. Elliott, the new pupil, has shown great improvement, and is progressing very rapidly. Sunday also included brilliant flying, notice of which has been made elsewhere. On Monday all Avro pupils were out, and Rolshoven went for his *brevet* in the evening.

### Brooklands Aerodrome.

On Tuesday, last week, Messrs. T. W. Elsdon (Vickers) and Grahame Harris (Bristol) passed their *brevet* tests in good style.

Mr. Hamel gave some fine exhibition flights on Wednesday with and without passengers on his two-seater Blériot monoplane.

On Thursday morning Mr. F. W. Merriam of the Bristol Aviation School, with Mr. Pendlebury, one of his pupils, paid a visit to the St. Nicholas' Home for Crippled Children at Pyrford. The airman arrived over the village flying at a height of about 2,000 ft., and a magnificent spiral descent was made to the unbounded delight of the children who had been looking forward to the promised visit with great interest. Later the airman made a difficult ascent owing to the many obstacles in a restricted area, and, after circling several times round the Home, returned to Brooklands.

Mr. Hamel arrived from Hendon on Saturday on his single-seater Blériot monoplane, making a fine spiral *vol plané* landing. He then had his two-seater brought out, and set off with the intention of visiting Blenheim Palace, Woodstock (where the Duke of Marlborough was holding a garden party), but he only got as far as Windsor, and had to return to Brooklands owing to engine trouble, his passenger being much disappointed at not being able to be present at the garden party. Mr. Barnwell made some fine flights on a Vickers biplane fitted with a 70 h.p. engine, the machine climbing very quickly and developing a rare turn of speed. Mr. Merriam gave some exhibition flights on his Bristol biplane, and Mr. Harry Hawker (fresh from his hydro-aeroplane triumphs and winning of the Singer prize of £500) was testing a new idea in "wind sticks," which proved of no use, on the Sopwith tractor biplane.

On Sunday, Mr. Hamel started on his single-seater, but had only gone a few hundred yards when the machine back-fired, owing to a valve going wrong, and a sheet of flame shot out. Mr. Hamel with great presence of mind saved the situation by at once landing, shutting off his petrol, and, jumping out of the machine, twisted the propeller round, thus preventing the fire from spreading. Nothing daunted) Mr. Hamel had his two-seater brought out, and was soon busily engaged in giving passenger flights, in the course of which he gave some fine displays, disappearing from sight in the clouds from time to time, and soaring round at an altitude of 5,000 ft.,

legitimate) much gain comes to others, indirectly through flying, is by writing aeroplane stories, some of which are too funny for words.

Gretna Green and a couple of postchaise have furnished many a poor writer with the wherewithal for a good meal before now, but the time came when editors closed their books against Gretna Green. The aeroplane has now come along at the critical moment.

I was reading one of these stories a short time ago, and there was the usual elopement by aeroplane. Unfortunately the lady's father did not possess a park, where the gay Lothair could descend with his machine at midnight and fly away with his naughty lady-love. Little things like this, however, have no terrors for the writer of aeroplane stories. Luckily the house had a billiard-room attached, which had a flat roof, and "the skilful pilot descended light as a bird, and putting on his brakes hard, brought the machine to rest with hardly any noise. Gently tapping on the window, he soon had his darling safely strapped in the passenger seat, and, putting on full speed, sailed away into the night, just as lights began to move about the house."

## FLYING GROUNDS.

from which height he would descend in graceful spiral curves, and when near the ground would literally put his machine steeplechase fashion at other machines on terra firma, over which he would lightly skim within a few inches. Mr. Barnwell was next out on the 70 h.p. Vickers biplane which he took up to a good height, and on which the winner of the ballot for the free passenger flight—a nurse named Miss Haines, of "Willerton," Weybridge—had a long trip. Mr. Merriam was next on the Bristol biplane on which he got as high as 3,500 ft., when he was quite invisible in the clouds, descending by means of a series of graceful right and left-hand spiral glides. Mr. Bendall was busy instructing pupils on another Bristol biplane, as too, was Mr. Merriam, and also Mr. Knight on the Vickers biplane. Mr. Barnwell also turned out on the 50 h.p. Blériot monoplane on which he is thoroughly at home, and went for a long flight. Mr. Hawker was busy testing the Sopwith tractor biplane fitted with ailerons, whilst Lieut. Smith-Barry made some good trips on the record-breaking Sopwith tractor biplane. Mr. Hamel on his two-seater, with a passenger, had a friendly race with Mr. Hawker, from which the former emerged triumphant.



Second Lieut. C. Francis Beevor, who took his Royal Aero Club's *brevet* on a 50 h.p. Gnome Vickers biplane at Brooklands on June 13th, reaching a height of 1,200 ft. whilst doing his figures of eight.



Second Lieut. A. E. Morgan, another pupil who has just taken his *brevet* at the Bristol School at Brooklands under the tuition of Mr. F. W. Merriam.

**Bristol School.**

—Mr. Richard Powell first up on Monday, last week, his landings being exceptional. Then figures of eight and landing very good. Lieut. Morgan followed with figures of eight and practising landing near to a mark; this pupil will go for his ticket this afternoon, also Mr. Grahame Harris. Merriam up behind Lieut. Low on straights and circuits twice, and giving Lieut. Cameron a trip, who is joining this evening. Merriam finished by taking Mr. Bernard Howard for a high flight over Weybridge.

Merriam first for test on Tuesday,

then sent Lieut. Morgan for his ticket, and after doing five excellent figures of eight in a puffy wind he misjudged his landing, and ran too far owing to wind behind. He tried again, this time landing nearly on the mark. Conditions were too bad for further flying.

On Wednesday, under trying conditions, Merriam solo, then up behind Lieut. Low on straights and circuits, also with Lieut. Cameron, new pupil. Mr. Grahame Harris then away for his *brevet* tests which he passed in excellent style, and could not possibly have made a better show. Merriam up again with Lieut. Low twice and Lieut. Cameron once. Merriam then finished by taking Lieut. Morgan for a trip, it being too windy for him to go for the second half of his *brevet*. Merriam, test, taking Mr. Pendlebury as passenger, then up with Lieut. Low, who was later alone for first time, going fairly good straights. Lieut. Morgan finished the second half of his *brevet* in excellent style. Merriam up behind Mr. Pendlebury. Mr. Bernard Howard solo in fine style, landing very neatly with engine off. Merriam testing missing engine and later up with Lieut. Low teaching him landings again. Darkness finished further flying.

Bendall for test on Thursday, then behind Mr. Pendlebury and Lieut. Low. Afterwards, these pupils solos, the former doing

straights and the latter circuits. Bendall again flying twice on circuits. Lieut. Low and Mr. Pendlebury again flying straights, afterwards too bumpy for further school work.

Merriam first out on Friday, taking Mr. Grey as passenger, teaching pupil to *vol plané*. Lieut. Low circuits and half-right hand turns in good style. Mr. Pendlebury doing left and right-hand turns with good landings. Merriam up twice with Lieut. Cameron on quite a number of straights and circuits, later finished by taking Mr. Pendlebury for a high flight.

Bendall test on Saturday, then Mr. Bernard and Lieut. Low two good solos, each landing near a mark. Bendall finished.

**Ducrocq and Lawford School.**—Wednesday, last week, Mr. Tsao, K. Wong joined the school. Thursday, all pupils out for four hours. Friday, they got in another three hours excellent practice, and again on Saturday morning they were out from 5.15 a.m. till 8.15 a.m., all progressing rapidly.

**Vickers School.**—Monday, last week, Barnwell and Elsdon solo on biplane; wind very bumpy.

In morning, Tuesday, Barnwell on biplane; test flight. Mr. Elsdon for *brevet* in good style, flying very steadily at uniform height, ending with good *vol plané* on each occasion. Knight with Mr. Webb. Mr. Newton-Clare figures of eight solo on biplane. In evening, Knight on biplane with Messrs. Newton-Clare, Fairfax and Webb. Messrs. Barnwell, Beevor and Elsdon on No. 3 mono. Barnwell, and then Messrs. Orr Paterson and Mitchell on No. 7 mono.

Early in morning, Wednesday, Barnwell on biplane with Capt. Fairfax. Knight with Capt. Fairfax and Mr. Webb. Mr. Newton-Clare solo. In evening Barnwell with Capt. Fairfax, Mr. Newton-Clare solo, Knight with Mr. Webb.

Thursday morning Capt. Wood on biplane. Mr. Newton-Clare solo. Knight with Capt. Fairfax. Knight, and then Messrs.



Lieut. Maurice J. Ambler (14th Hussars), who passed his pilot's certificate test in excellent style at the Temple Aviation School at Hendon last week.



Three pupils who have taken their Royal Aero Club's pilot's certificates during the past week at the Bristol School at Brooklands under the tuition of Mr. F. W. Merriam. From left to right, Mr. Graham Harris, Mr. Skene, and Mr. G. Pendlebury.



Mitchell and Orr Paterson on No. 7 mono. In afternoon Barnwell testing new biplane No. 21, both solo and with passenger. Messrs. Mitchell and Elsdon on No. 3 mono. Knight on biplane with Messrs. Smith and Webb. Barnwell with passenger. Lieut. Smith solo straights. Mr. Newton-Clare solo circuits and eights.

Knight on biplane, Friday morning, with Capt. Fairfax. Mr. Newton-Clare solo. Lieut. Smith solo circuits. Barnwell with Capt. Fairfax and Lieut. Smith. In evening, Knight on biplane with Mr. Webb. Knight test flight on No. 3 mono. Mr. Elsdon straights. Mr. Newton-Clare solo on biplane. Messrs. Barnwell, Orr Paterson, Mitchell, and Andreae on No. 7 mono. Barnwell and Newton-Clare on biplane.

Saturday morning, Knight on biplane with Capt. Fairfax and then with Mr. Webb. Lieut. Smith and Mr. Newton-Clare solo on biplane. Knight test on No. 3 mono. Mr. Elsdon straights. In forenoon Barnwell testing biplane No. 21 with 70 h.p. Gnome. In evening Barnwell on biplane No. 21 with passenger.

Sunday afternoon Barnwell and Knight on biplane No. 21, solo and with passengers. In evening Capt. Wood on biplane No. 21. **Eastbourne Aerodrome.**

TUESDAY, Wednesday and Thursday of last week were three distinctly off days, rain and wind keeping everyone indoors. Fowler did venture out on Wednesday afternoon so as not to disappoint a very keen passenger, but after a short flight was obliged to return to the hangar. On Friday morning the weather improved, so the 70 Gnome Henry Farman hydro-biplane was brought out and some useful school work was put in, Fowler making a test flight, then taking Messrs. Fill and Hucks up in turn. In the afternoon the school biplane was busy, Fowler doing two solos, followed by Mr. Fill, who also did a solo. Gassler and Roberts were out putting in some practice on the Bristol.

Saturday was stormy, preventing anything being done, and not until Sunday evening could the machines be brought out, when Fowler tested the biplane, then took Mr. Bevis up twice. Messrs. Fill and Gassler each did two solos, and Lieut. Brown had a practice stunt. Fowler then took up a lady passenger. Monday morning, in the early hours, Fowler had Mr. Bevis up three times, and Mr. Fill did two solos, his figure 8's being particularly good. Gassler was also up twice. Later in the morning Mr. Fry received his first lesson on the hydroplane, after which Fowler was busy passenger carrying along the front on the 80 Gnome H. Farman, until evening, when this machine was housed and the school 'bus brought into requisition again. Fowler had Mr. Fry (who is now in the pilot's seat) up twice, and Mr. Fill did a solo, flying high and doing very large circuits well outside the aerodrome. Roberts and Gassler were out practising until dark.

#### Liverpool Aviation School, Waterloo.

On Friday last, week when a 20-mile wind was blowing all day, Melly did a solo on two-seater flying as far as Altcar in the morning; on his return he flew over the Isle of Man boat "Ben-my-chree"

which he saluted from 500 ft. and was duly acknowledged by their siren. At 2.30 in the afternoon he started again and rose to a height of 1,200 ft. in a series of figures of 8, in the last of which he made a complete circle round the "King on the Galatea," at the same time circling the two warships in the harbour, the flight lasting 18 mins. On his return he took up Mrs. Melly for one figure of 8 lasting 8 mins., landing in a spiral *vol plane* from 600 ft. At 4.30 he again started and after several figures of 8 near Gladstone Dock, again passed over the "Galatea" as she broke the ribbon. On his return Hardman took out the Y Anzani doing a fine figure of 8 at 700 ft., passing along the Gladstone Dock while the King was performing the opening ceremony.

At the request of the Lord Mayor (Sir Harmood Banner) the Y Anzani was exhibited at his garden party, at the Botanic Gardens, on Saturday, but in the absence of space no flying was intended or attempted, the machine being taken by road both ways.

#### London Aerodrome, Collindale Avenue, Hendon.

**Grahame-White School.**—Monday, last week, 5 a.m., Lieut. Eales out doing straights with Instructor Manton in passenger seat. Mr. H. Russell out at 6.5, also practising straights with instructor.

Sir A. Sinclair out at 5.40 a.m. Tuesday, doing straights and figure eights, and practising for *brevet* tests, all of which he passed later in the morning, flying in good style. Lieut. Boddam-Whetham doing circuits at 6.36 on No. 109, and getting good practice. Lieut. Eales doing straights with instructor at 7 p.m. in slightly windy weather. Mr. H. Russell also doing straights with instructor in passenger seat. Lieut. Boddam-Whetham circuits and figure eights, afterwards passing all *brevet* tests. Mr. H. Russell circuits with Instructor Cheeseman in passenger seat, followed by Mr. J. D. North and Lieut. Moore, also doing circuits with instructor.

Wednesday, Lieut. Eales out at 6.25 a.m. doing straights with Instructor, also Lieut. Moore. Mr. Russell also straights with Instructor. Pupils continued getting good practice all the morning. Mr. J. D. North out at 7.30 p.m. circuits with instructor, also Mr. Russell and Lieut. Moore.

Lieut. Moore on No. 109 at 7.5 a.m. Thursday, doing straights with instructor in passenger seat, followed by Mr. Russell and Lieut. Eales. Pupils unable to get much practice owing to *brevets* being taken.

Friday 8.5 p.m., Mr. H. Russell doing circuits with instructor. Sir A. Sinclair circuits, Lieut. Moore and Mr. North circuits with instructor.

Saturday at 6.30 a.m., Mr. H. Russell and Lieut. Moore straights with Instructor Manton, both pupils showing good progress in landing.

**W. H. Ewen School.**—Monday last week, the school was out at 5.10 a.m. under Mr. L. W. F. Turner, when, after testing the 35 h.p. Caudron No. 1, he handed machine to Messrs. Strange and Jagenberg, who were making good progress in straight flights.



THE PRESS ASSOCIATION BRIGHTON WALK.—The competitors at Hendon Aerodrome and Mrs. R. T. Gates, who presented the medals.

"Flight" Copyright.



Mr. H. Stewart also made a short flight on same machine. During afternoon Mr. Turner made several flights.

Pupils out 4.20 a.m. Tuesday, when Mr. Turner after test flight on 35 h.p. Caudron No. 1, handed machine to Mr. H. Gist, who was making good progress in circuits. M. Baumann made test flight on 35 h.p. Caudron No. 2. Messrs. Jagenberg, Strange and Dalrymple-Clark then straight flights in good style. School again out 6 p.m. After test flight, M. Baumann handed No. 2 machine to Messrs. Strange and Dalrymple-Clark for half-circuits, Mr. L. H. Jagenberg doing straights, and Capt. Jennings rolling. Mr. H. de Havilland received his first instruction on same machine. Mr. Turner made test flight on 35 h.p. Caudron No. 1, after which Messrs. Warren and Goodden made flights, and Mr. Gist circuits on same machine.

At 5 a.m. on Wednesday, M. Baumann was on 35 h.p. Caudron No. 2, and then handed machine to Messrs. Dalrymple-Clark, who was doing half-circuits, Mr. L. H. Jagenberg doing straights and Mr. H. de Havilland and Capt. Jennings rolling on same machine. Turner was out with pupils on the 35 h.p. Caudron No. 1. After test flight he handed machine to Messrs. Strange, Dalrymple-Clark and Stewart who were making straight flights. School again out at 6.20 p.m. when M. Baumann was instructing Mr. de Havilland and Capt. Jennings, who were making good progress in rolling. During the evening Mr. Turner made several flights on 35 h.p. Caudron No. 1.

On Thursday, school at 4.10 a.m. After test flight on 35 h.p. Caudron No. 2, M. Baumann handed machine to Mr. de Havilland and Capt. Jennings who were rolling. Mr. Turner test flight on 35 h.p. Caudron No. 1. Messrs. Strange and Dalrymple-Clark then made straight flights, and Mr. F. W. Goodden also up on same machine. At 6.30 p.m., after test flight by M. Baumann on Caudron No. 2, Mr. de Havilland made short flights, and Capt. Jennings and Mr. C. George hopping on same machine. Mr. Turner test flight on No. 1 and then handed machine to Messrs. Strange and Dalrymple-Clark who were doing half-circuits.

The school out at 4.10 a.m. Friday, when M. Baumann after test flight on Caudron No. 2, handed machine to Messrs. de Havilland and George, who were making short flights. Mr. L. W. F. Turner test flight on No. 1, and then Messrs. Strange, Warren, Goodden, and Gist doing circuits and short flights. Mr. T. H. Bayetto also made a flight on same machine.

On Saturday, school at 4.10 a.m. Mr. Turner test flight on No. 1; Messrs. Strange and Dalrymple-Clark making good progress in half-circuits. M. Baumann test flight on No. 2. Capt. Jennings hopping. During the afternoon Mr. Turner made several exhibition flights.

Sunday was too windy for school work. Mr. Turner made a flight on 35 h.p. Caudron. M. Baumann out later on the same machine.

**Temple School.**—On Wednesday last week, at 5.45 a.m., under George L. Temple, Douglas Ritchie, Lieut. Maurice Ambler and A. Vaile each had 10 mins. on Caudron.

The next morning, at 5.30 a.m., G. L. Temple tested the air for

10 mins., and sent Lieut. Ambler for his certificate. This pupil passed the whole of his tests that morning, flying steadily throughout, and making his second landing dead on the mark—an excellent performance. Later G. L. Temple made a short flight in his usual good style. On Saturday, Messrs. Ritchie, Vaile and R. Penny each had 10 mins. on Caudron.

## Salisbury Plain.

**Bristol School.**—Little flying was possible on Monday morning last week, conditions unfavourable. Busted in the evening got on Bristol tractor biplane, 2,000 ft., flying excellently. Major Hewetson, Capt. Popovici, Lieut. Pascanu, Lieut. Beroine and Mr. Delaplane good monoplane solos. Lieut. Stevenson two long biplane solos, practising landings. Pixton and Mr. Archer (old Bristol pupil), and Busted out on tractor, but heavy rain prevented further flying.

On Tuesday, Busted first out for test on Bristol tractor. Lieut. Stevenson two long biplane solos, Pixton also on biplane with Lieuts. Beroine and Pascanu, afterwards these pupils first biplane solos in fine style. Major Hewetson, Mr. Garnett, Capt. Popovici, Lieut. Pascanu and Lieut. Beroine each for two good monoplane solos. Pixton finished up with solo to test new motor. Weather too bad in the evening for tuition.

Jullerot out early for a trial on Wednesday, Lieut. Stevenson good biplane solo. Busted three flights on the tractor biplane, Sippe and Lieut. Stevenson as passenger at 3,500 ft. on one of the tandem monoplanes, Jullerot flying solo on same machine. Lieut. Beroine and Pascanu each up for trips on biplanes, in the evening, Pixton taking a passenger on a biplane. Lieut. Stevenson, Lieut. Pascanu, and Beroine long biplane solos. Jullerot out with two prospective pupils. Fog too thick on Thursday for any flying.

Jullerot for trial on Friday, later good biplane solos by Lieut. Stevenson, Capt. Popovici, Lieut. Beroine, Lieut. Pascanu, twice each. Pixton for biplane solo then giving trips to two prospective pupils. Busted and Lieut. Pascanu up to 1,000 ft. on tractor biplane, Pixton on similar type of machine with Lieut. Stevenson. Jullerot finished by taking a prospective pupil for a flight.

**Royal Flying Corps, No. 3 and 4 Squadrons (Netheravon).**—On Monday, last week, the wind and rain curtailed flying, but Lieut. Wadham was out on BE 203 with Major Brooke-Popham. Capt. Allen was also up three times on this machine, once with Christie.

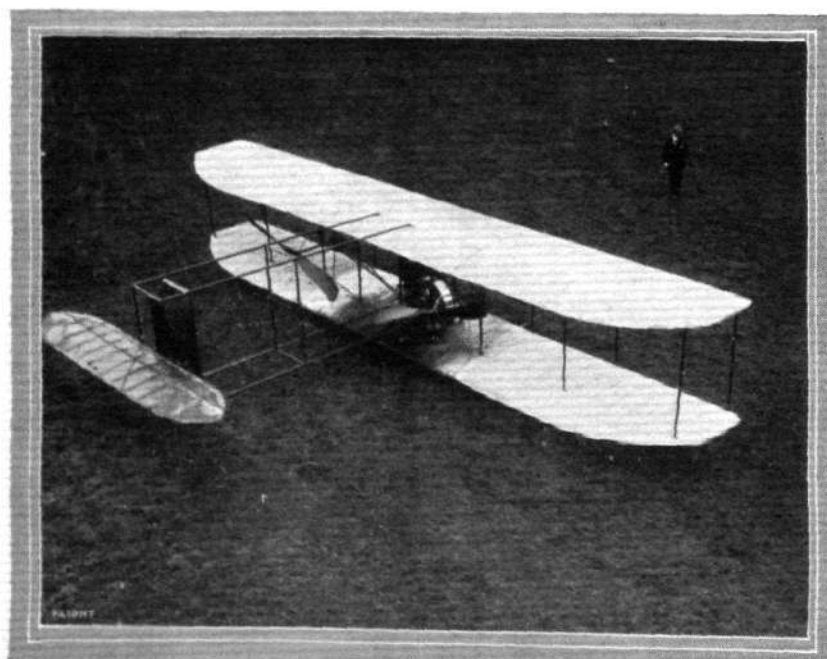
Lieut. Carmichael made five flights on H. Farman 284 for the purpose of observing artillery fire. Lieut. Hubbard on H. Farman 352 twice took Major Brooke-Popham to the artillery ranges. Lieut. Hubbard afterwards took up Sergt. Farrer.

In the better weather on Tuesday Major Brooke-Popham was first to ascend on BE 203, followed by Capt. Allen, who was up for 1 hour 16 mins., and made four flights. Lieut. Porter afterwards made three trips on same machine. Lieut. Christie made two flights on BE 203, and Lieut. Carmichael was on a Henry Farman. Lieut. Hubbard afterwards made some good flights on H. Farman 352 with passengers. Major Brooke-Popham afterwards had two flights on Avro 285. Major Brooke-Popham was also out early on Wednesday on BE 203, putting in nearly two hours' flying. Three flights were made by himself, after which he took up four air-mechanics and also one of the O.T.C. Capt. Allen also made a flight with a passenger. Lieut. Porter and Lieut. Carmichael did good flying with passengers during the day. Lieut. Hubbard out on Henry Farman 352, and taking Lieut. Roupell to Rabbit Hill, over Andover Camp and back in 25 mins. After he made three more flights, with Lieut. Abercromby for two flights to Bulford and round the surrounding country, and one with Lieut. Petts, of the O.T.C. Lieut. Burroughs on Avro 285 for a short flight round the aerodrome for 37 mins., after which Major Brooke-Popham made a flight on the same machine, doing good flying.

Major Brooke-Popham made four trips on BE 203, on Thursday, and Lieut. Carmichael made a good flight on H. Farman 284, flying for 1 hour round the aerodrome, and reaching a height of 3,000 ft. Later he took Major Brooke-Popham up for reconnaissance work.

On Friday, Lieut. Christie was up on BE 203, but had engine trouble. Lieut. Carmichael with passenger, on Henry Farman 284. Lieut. Roupell three times on H. Farman 286, and Lieut. Hubbard three times on Henry Farman 352.

Saturday, Major Brooke-Popham on BE 203 for three flights. Lieut. Carmichael on Henry Farman 284 two flights, one with Lieut. Christie as passenger. Lieut. Roupell on Henry Farman 286 for three flights with Lieut. Conran.



Mr. Beatty's Wright biplane, with Gyro motor, at Hendon.

"Flight" Copyright.

# BRITISH NOTES OF THE WEEK.

## The "Hermes" at Yarmouth.

FROM the time of its arrival in Yarmouth roads at the beginning of last week until its departure on Tuesday last the aeroplane parent ship "Hermes" excited no small amount of interest among inhabitants and visitors at the popular resort. Crowds waited patiently on the promenade in the hope of seeing some flying, but it was not until Wednesday morning that one of the hydro-aeroplanes was in the air for half an hour. A second machine was launched, but a sudden change in the weather caused both machines to be speedily hoisted back on board. On the subsequent days flights were made from the ship, and on Monday Lieut. Bowhill had an exciting experience when his machine side-slipped into the sea. Fortunately the pilot was little the worse for his adventure, and the aeroplane was subsequently recovered.

## The Handley Page Monoplane at Hull.

IN very unpropitious weather Mr. Whitehouse opened a four days' exhibition of flying at Hull on Thursday of last week. His first flight was of about a quarter of an hour's duration and included the circling of Beverley Minster. Subsequently he made another trip, during which he carried out some fancy flying, while he finished up by transporting on his Handley Page aeroplane a special edition of a local paper. He also made some flights on Friday, the last one being made after dark, rockets and flares being used to guide the pilot in landing. The flying on Saturday was suddenly ended by a mishap. The engine failed as Whitehouse was leaving the ground and he had to make a forced landing in a cornfield. The machine rolled into a dyke and stood on its head with its tail in the air. Fortunately the skid, which stuck in the mud, bore the brunt of the shock and only the propeller was damaged. This was at 6.30 p.m., and four hours later the machine was at the flying ground, and by working all night it was got ready for the next day, which was the most exciting day of all. Whitehouse had been warned that if he ventured in the air he would be liable to proceedings under the Sunday Observance Act of Charles I. He, however, made a flight, and his name and address was duly taken by the police, and not only so but six constables worked for some four hours in securing the names and addresses of, according to one statement, about 3,000 spectators (although the figure was probably nearer 250), who, it was hinted, might be charged with "assembling on the Lord's Day outside their own parish for the purpose of sports or pastimes," an offence which may entail a fine of 3s. 4d. or imprisonment. On Wednesday, the magistrate refused to grant summonses against Mr. Whitehouse and his friends, on the ground that the Act did not apply to aviation.

## Testing a Short Machine.

DURING the week-end, Mr. Sydney Pickles was testing one of the 38-type Short machines, similar in general construction to that described in FLIGHT a week or so back. The biplane has a 50 h.p. Gnome engine, and has the propeller behind the main planes. With a passenger and full load on board, the machine climbed 200 feet a

minute, attaining a height of 3,000 ft. in barely 15 mins. During an hour's flight, the machine was piloted over Sittingbourne and the Isle of Sheppey. The greatest altitude attained was over 4,000 ft. At a height of 3,500 ft. the engine stopped, but Mr. Pickles brought the machine down safely by a series of left and right spirals.

## Somerset to Present Hydro-Aeroplane.

MRS. DE BEAUVOIR STOCKS, of West Combe, Evercreech, one of the few British lady pilots, is endeavouring to raise a fund in Somerset for the purpose of presenting a hydro-aeroplane to the British Navy. Word has been received from the Lords Commissioners of the Admiralty that they will receive with pleasure such evidence of the patriotism of the county.

## The New Cody Biplane.

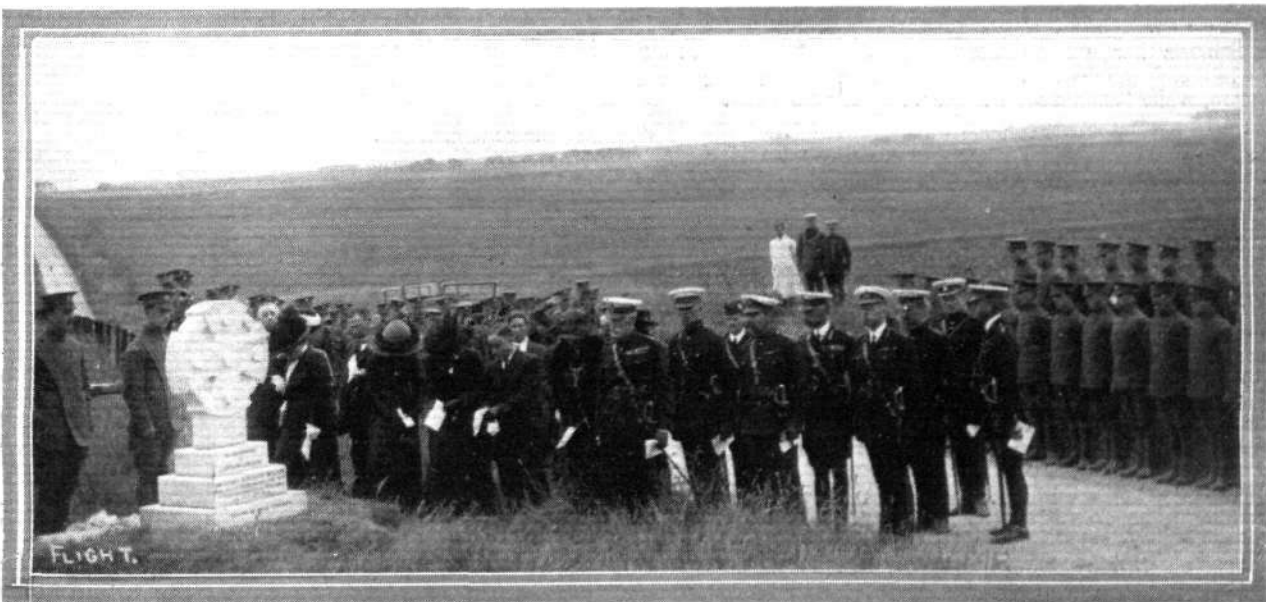
LAST week-end Col. Cody was testing the new biplane, which he has built with the intention of competing in the *Daily Mail* race round Britain. In general design the biplane is similar to that which won the military competition, but it is larger, and has only one cruciform tail. The 100 h.p. engine drives a four-bladed Garuda propeller. A central skid with an upturned tusk in front is fitted, and skids are arranged under the outward sections of the main planes to take the place of the wheels which were formerly mounted at the wing tips. When the machine has been thoroughly tested it will be fitted with three floats with which Col. Cody has been conducting trials on the Basingstoke Canal.

## An Accident at Hendon.

AN accident, which fortunately just missed being rather serious, occurred in the early hours of Saturday morning last at the Hendon aerodrome. A former pupil of the Grahame-White school, Mr. Cyril Lan-Davis, was making some trial flights on a Valkyrie monoplane (which he had purchased some little time back). After some success in the aerodrome, he started off on a cross country flight, and appeared to be flying rather unsteadily, when seemingly a gust struck the machine as a turn was being attempted, for the monoplane banked over very steeply, first to one side then to the other, and finally dived into a tree just outside the aerodrome. M. D. Manton, seeing the machine fall, started off on the 50 h.p. Grahame-White 'bus to see what had happened. He caught sight of the monoplane hanging smashed in a tree with the unfortunate pilot lying on the ground surrounded by a few people. Immediately he flew back to the aerodrome, and at once dispatched assistance, when it was found that Mr. Davis was rather badly cut about the face.

## Messrs. Smith and Son's New Premises.

MESSRS. S. SMITH AND SON, of No. 9, Strand, famous for motor accessories, and who are now turning their attention to instruments and fittings for aeroplanes and airships, are now installed in their new premises at 179-185, Great Portland Street, and Mr. W. J. Harvey has been appointed London manager. The new Smith headquarters are self-contained, the top half being given up to manufacturing, the lower floors to stores and offices, and the ground floor to showrooms.



MEMORIAL TO CAPT. LORAINÉ AND STAFF-SERGEANT WILSON.—Scene at the unveiling of the Memorial, by General Smith-Dorrien on July 5th, in memory of the fatal accident to these two members of the Royal Flying Corps who were killed whilst flying on July 5th, 1912, exactly one year ago.



# FOREIGN AVIATION NEWS.

## Paris-Berlin Flights.

FOR some two years a prize of £500, together with a cup value £100 offered by Herr Batschari, has been waiting in Germany for the first man to make the trip between the German and French capitals, and it was quietly carried off on Saturday by Audemars on his Morane monoplane fitted with Gnome engine and Chauvière Integral propeller. He made a first attempt on the 9th inst., when, however, he only got to Guetersloh, and in landing smashed his propeller. He returned to Berlin and made a fresh start from Johannisthal on Saturday at 4.10 a.m. He made stops at Hanover, Bielefeld, Wanne and Rheims, and landed at Villacoublay at 7.52 p.m.

On Sunday, Letort made the journey in the reverse direction, and succeeded in covering the distance of 920 kiloms. without a stop, thus incidentally making a new record for non-stop cross-country flying. Leaving Villacoublay at 4.23 a.m., the pilot steered his machine past Soissons, Lens, Liege and Hanover, sometimes having to fly down to within 50 metres of the ground in order to keep his course. After Hanover was passed, however, the mist lifted, and then Letort was able to mount to 3,000 metres. He arrived at Johannisthal at 12.10. Unfortunately, in landing, the machine hit an obstacle on the ground and capsized, resulting in a wing being damaged, and necessitating the abandonment of the intention to continue the flight to Riga, &c., in an attempt for the Pommery Cup. The machine, which was a Morane monoplane with 80 h.p. Rhone engine and Chauvière Integral propeller, started from Villacoublay with 235 litres of petrol, and after flying 920 kiloms. in 7 hrs. 43 mins., there remained in the tank 88 litres.

## 580 Kilom. Trip by Lieut. Varcin.

HAVING received orders to rejoin the Chateaudun centre, Lieut. Varcin on Monday started from Pau on his M. Farman biplane at 4.30 a.m. and made a non-stop flight to Chateaudun, where he landed at 12.18. He was accompanied by a sapper.

## Calais to Issy Non-Stop.

STARTING from Calais at 4.20 a.m. on the 8th inst., Guillaux, on his Clement-Bayard monoplane, made a non-stop trip to Issy, where he arrived at 6.30 a.m., having flown most of the time at a height of 1,800 metres.

## Guillaux Tries Again for Pommery Cup.

WITH the intention of flying to Casablanca in an attempt for the Pommery Cup, Guillaux on his Clement-Bayard monoplane left Issy on Saturday morning at two minutes past four, and after a splendid non-stop trip he landed at Bordeaux at 9.3 a.m. He, however, was so bothered by the thick mists which prevailed that he decided not to go on.

## Fast Work on a Bathiat.

IN a speed test at the meeting at La Ferte-Vidamee on Saturday, Bathiat, on his Bathiat-Sanchez-Clerget monoplane, covered 200 kiloms. in 1 hour 50 mins. On Sunday, Bathiat won the altitude contest; Vial on a H. Farman being second.

## Returning Home from Calais.

AFTER their visit to Calais both Robinet and Bathiat on Bathiat-Sanchez-Clerget monoplanes commenced on the 9th inst. to fly back to their headquarters. Bathiat made a splendid flight to Mourmelon, while Robinet went to the Vidamee aerodrome.

## Mailly-Etampes by Gougenheim.

ON Sunday Gougenheim, on his Henry Farman machine, with a passenger, made the 150 kilom. trip from Mailly Camp to Etampes in good time.

## Brindejone Flies South.

HAVING an engagement to fly at Castillonnes, Brindejone des Moulinais, on Sunday, flew there on his Morane Saulnier monoplane, from Villacoublay, near Paris, by way of Orleans and Poitiers.

## A Three-Cornered Match.

ARRANGEMENTS have been made for a series of flights to be made by Brindejone des Moulinais (Morane), Audemars (Morane), and Guillaux (Clement Bayard) at Juvisy this afternoon. The competition between these three champions is to be on similar lines to the match between Audemars and Garros which was held a week or so ago.

## E. Archdeacon Flies with H. Farman.

IN order to be present on Sunday last at the inauguration of the station for hydro-aeroplanes at Boulogne-sur-mer, Henry Farman and Fischer on their hydro-aeroplanes left Buc on the 11th inst. Henry Farman was accompanied by M. Ernest Archdeacon, while Fischer had his mechanic on board. On account of the heavy winds encountered a stop was made at Crotoy, from whence the journey to Boulogne was completed in about an hour on Saturday morning.

## Over the Alps to Milan.

FOR the third time the Bernese Alps have been crossed by aeroplane, and the flight made by Bider on Sunday surpassed the previous attempts by Chavez and Bielovucic, inasmuch as he started from Berne and went on to Milan, the passage of the Alps being but an incident in a trip of 225 kiloms. Starting on his Blériot, which has an 80 h.p. Gnome, and Chauvière Integral propeller, from Berne at 4.8 a.m., Bider rose at once to a great height, and then went off in the direction of the Jungfrau (3,470 metres high). Passing this at 6.7, at a height of about 4,200 metres, he went on and passed the Eggishorn, a quarter of an hour later. In this part of the journey he was much troubled by the disturbed state of the air, but he continued safely, and landed at Domodossola at 6.40 a.m., meeting with a very enthusiastic welcome. After filling up his petrol and oil tanks he resumed his journey, and landed on the military ground at Milan at 8.42. He carried a letter from the President of the City of Berne to the Mayor of Milan.

## How they do it in France.

TWENTY military aviators, including Capt. Bertin, Lucas, Aubry and Lieuts. Noé, Nicaud, Battini, have been made Chevaliers of the Legion d'honneur, while Col. Estienne has been promoted an officer of the order. Thirteen non-commissioned military pilots have also been awarded the military medal.

## Good Work by Farman Pupils.

ANOTHER superior *brevet* test over the 150 kilom. course between Etampes and Mailly Camp was made by Dufont, one of the Comite National pupils at the Farman school, on the 9th inst. The same day Lieut. Conran passed his ordinary *brevet* tests on a Farman at Etampes.

## Aeroplanes and Airship at French Review.

INCLUDED in the review which was held at Longchamp on Monday were two escadrilles and one airship. The aeroplanes were six R.E.P. and five Farmans, while the airship was the "Commandant Coutelle."

## Double Fatality at Buc.

ON Monday while M. Bertin was flying a monoplane designed and built by himself, near Marsailles, the machine fell from a height of about 30 metres, and the wreckage caught fire. Both the pilot and his 21-year-old son, who was with him as passenger, were killed.

## Levasseur at Hamburg.

CONTINUING his tour of Europe, Levasseur on the 10th inst. on his Nieuport hydro-monoplane went on to Amsterdam. Leaving Rotterdam at 9.35 a.m. he flew overland by way of Utrecht and Bussum, instead of keeping over the sea as was his original intention, and he landed in the basin of the Navigation Exhibition at Amsterdam at 11.5. Exhibition flights were made on Saturday and Sunday, and on Monday Levasseur went on to Hamburg.

## Berlin to Have Another Aerial Derby.

WHAT cannot be done in this free country can be accomplished in military Germany, as is evident from the fact that arrangements have been made for the Round Berlin competition, to be held on August 30th and 31st. The start and finish will be at the Johannisthal aerodrome. It is hoped that the competition will become an annual one.

## A Fatality at Mulhouse.

WHILE flying over the Habsheim aerodrome, near Mulhouse, on Monday, the machine of Dietrich capsized, and the pilot sustained such severe injuries that he died within a few minutes.

## M. Caudron Over Peking.

IN order to deliver the twelve Caudron aeroplanes ordered by the Chinese Government, M. Caudron has been paying a visit to Peking, and last week made several trips over the city. During one he flew over the President's residence, and dropped a letter addressed to Yuan Shih-kai. The flying school is to be in South Hunting Park, and as soon as the pilots qualify, a couple of the machines will be stationed at Kalgan to help in suppressing the Mongolian raids.

## Flying Across Lake Michigan.

IN order to take part in the cruise of flying boats from Chicago to Detroit, L. A. Vilas on his Curtiss flying boat, on the 1st inst., traversed Lake Michigan from St. Joseph, Mich., to Chicago, a distance from point to point of 56½ miles, the trip taking one hour and ten minutes. He was accompanied by a friend, his average altitude being 2,500 ft., but at one point he got up to 3,200 ft. Not having a compass he steered by the sun, and allowing for drift, &c., estimated that he covered about 70 miles altogether.



# SKIMMERS AND HYDRO-AEROPLANES.

## THEIR LONGITUDINAL STABILITY.

By J. E. STEELE, B.Sc.

(Concluded from page 771.)

THE next type is in the transition stage between the skimmer and the all-air machine, being designed to fly with its tail always on the surface of the water, and it only leaves the water for an occasional bound into the air, which bound is involuntary, and not one of its natural functions.

### "Flying-Fish."

The *fuselage* of the monoplane (Fig. 4), taken as our example of this type, consists in a water-tight aluminium tank 7 ft. 2 in. long,

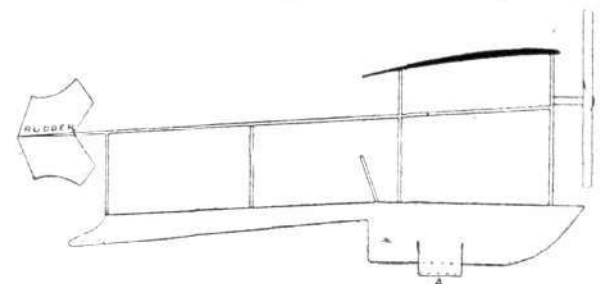
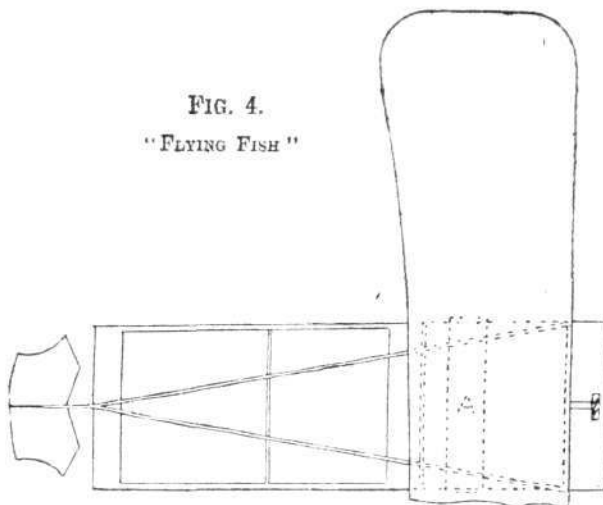


FIG. 4.

"FLYING FISH"



5 ft. 7 in. wide, and 2 ft. deep, with rounded-up bow. The sides of the *fuselage* are carried aft past the hull for 10 ft., where they are connected by a cross piece 1 ft. wide, which forms the tail. To facilitate the rising of the fore part out of the water, a plane is fitted below the tank part of the body, which plane is tilted up at the fore end so as to ride up through the water. At a moderate speed the *fuselage* lifts completely out of the water, and the machine glides on the forward plane (A) and the tail. At high speeds the tail only is on the water, all the rest being air-borne. This machine attains a speed of between 65 and 70 miles an hour, and is fitted with a single traction screw in front.

When skimming along with its tail on the water (Fig. 5), the "Flying-Fish" is a double-lifting system. The front plane has of necessity a greater angle of attack than the after plane, and the pressure of wind and water respectively on these planes, resolve themselves into the resultant pressure  $R$ , which must act through the meeting point  $O$  of the remaining forces of propeller pull and gravity. The lift of the air or water thrust on the planes, together with the vertical component of the propeller pull, is equal to the weight of the machine; while the horizontal component of the pull of the propeller must equal the drift of the pressures on the planes.

If the pull of the propeller becomes greater than that required to do its portion of the weight lifting, also to overcome the drift, then the forces on the machine will no longer be in equilibrium, but there will be an unbalanced force which will tend to accelerate it in the vertical plane; this will result in a bound into the air. When the machine is altogether air-borne, nearly all the pressure exerted on the after plane has been removed, as now water no longer acts there, only air. The result is that, while  $R_F$  remains the same,  $R_A$  almost vanishes, causing  $R$  to swing forward so that it no longer passes through  $O$ . The machine is now no longer in equilibrium under the action of the forces, and a couple is generated tending to overturn the machine backwards. If the machine be inherently longitudinally stable, she will trim by the stern until the moving of

the point  $O$  forward along the line of action of the propeller pull, together with the travelling aft of the centre of pressure due to the increased angle of attack, again causes  $R$  to act through  $O$ .

If the machine does not readily assume the new position of equilibrium, the horizontal rudder must be brought into play. When the machine was skimming this rudder was neutral—that is, it had a grazing incidence to the relative wind, and had, therefore, no normal thrust on it. Now, however, it must play its part in the equilibrium of the system, and must be inclined so as to present a face to the wind, which will then exert the lifting force on that part necessary for the restoration of equilibrium. The increase in propeller pull means a bigger vertical component, which would continue to lift the machine were it not for the loss in lift of the after plane, due to the defect of air over water pressure. Again, the increased propeller pull gives rise to a greater horizontal component available for overcoming the drift, and as, at the same time, the latter is lessened by the reduction of drift on the after plane, the machine bounds forward till the loss in lift brings her again on the water.

If the machine be inherently longitudinally stable when flying horizontally in the air, then the critical time as regards stability is when rising from the water, as then the stability falls off as the angle to the horizontal increases; no fear need be felt when alighting, as, the above condition being fulfilled, the machine increases in stability as it descends from the horizontal position.

In what has been said above, the following assumptions have been made. The head resistance has been neglected, that is resistance due to the wind pressure on the machine, engine, and pilot, and under this heading has also been included the effects of skin friction on the planes. The effect of the concavity of the planes has also been neglected. This results in an alteration in the direction of the resultant pressure, also in the position of the centre of pressure. If, when the angle of attack diminishes, the centre of pressure moves forward towards a limiting position, as in the case of flat planes, then there is a loss in stability due to cambering the planes. If, as the angle of attack diminishes, the centre of pressure moves aft, then there is a gain in stability due to adopting camber. Eiffel has shown experimentally that in cambered planes the centre of pressure *does* move aft as the angle of attack diminishes.

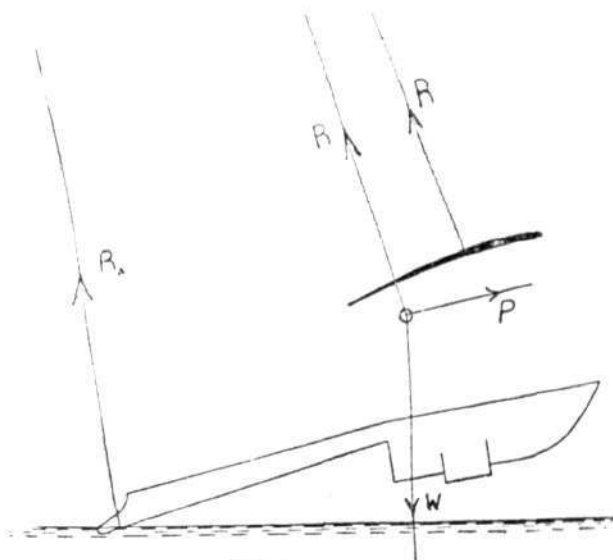


FIG. 5.

The last type chosen for consideration is a machine which is designed to rise from and alight on the water, but it is otherwise purely an air machine, doing long-sustained flights in that medium.

As an example of this class of machine, we take the Donnet-Lévêque hydro-aeroplane, which has proved a great success, and is nearer the naval architect's heart than hydro-aeroplanes whose only claim to the additional title consists in small floats being fitted to an ordinary air machine, instead of the usual wheels and skids which enable the aeroplane to rise from and alight on the ground.

The single float of the Donnet-Lévêque makes the machine more seaworthy than the multi-float system used in other hydro-aeroplanes, which is good only when the surface of the water is smooth. The hull is divided into several water-tight compartments, which adds to the seaworthiness of the machine.

This hydro-aeroplane attains a speed of 70 miles an hour, which is remarkable, as its plane area is comparatively small—183 square feet.

## The Donnet-Lévéque Hydro-Aeroplane.

This is a biplane (Fig. 6), whose water-tight, torpedo-shaped fuselage is on the lines of a skimmer, having the characteristic step of the latter. Near the blunt nose of the fuselage there is a horizontal elevator, which prevents the nose from diving when alighting, and the machine from consequently tripping over. When sufficient speed is attained the after end lifts, and the machine glides on the sloping front. After skimming on the surface of the

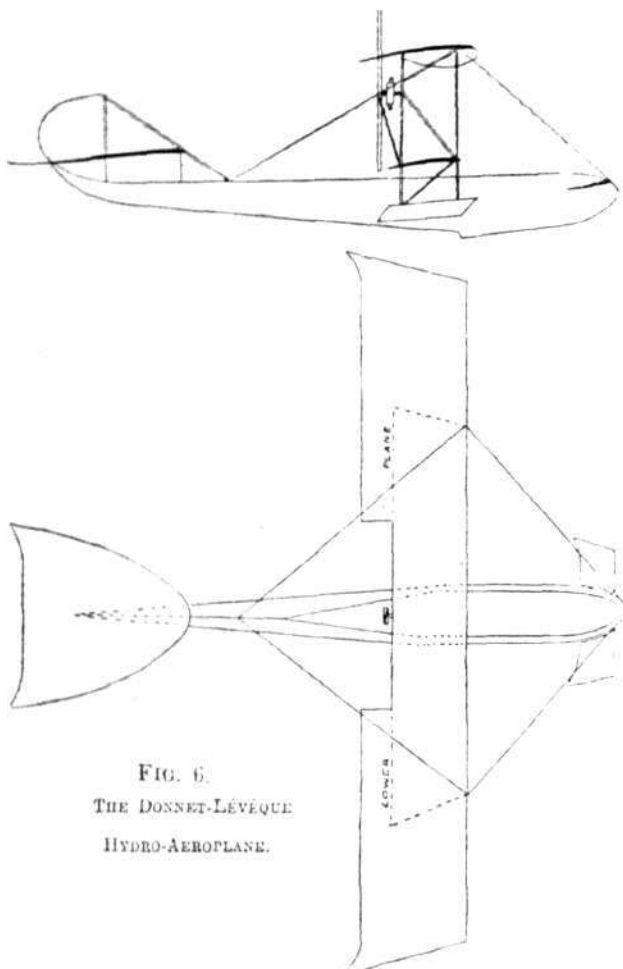


FIG. 6.  
THE DONNET-LÉVÉQUE  
HYDRO-AÉROPLANE.

water for about 50 yards, an elevation of the rear elevator causes the machine to rise bodily into the air. The head resistance is reduced to a minimum by the propeller, with its Gnome engine, being placed at the after end; the wash from the propeller thus encounters no obstacles.

When gliding on the surface of the water on its sloping front (Fig. 7) the weight of the machine, together with the vertical component of the propeller thrust—the thrust in this case tending to depress the machine—is shared by the lift of the resultant water pressure ( $R_F$ ) on the sloping portion of the fuselage, and the lift of the resultant air pressure ( $R_P$ ) on both the front planes. The drift of both the water-borne portion of the fuselage and of the planes is overcome by the horizontal component of the propeller thrust. The horizontal rudder as yet plays no part in the equilibrium, as it is probably neutral. The three forces  $R$ ,  $T$ , and  $W$  meet in the point  $O$ .

As was seen when considering "Miranda IV.," an increase in the propeller thrust will cause the machine to rise into the air, so that steering in a vertical plane can be accomplished by increasing or diminishing the thrust of the propeller. An increase in propeller thrust then tends to cause the machine to rise, and it will raise it altogether into the air when the thrust gets large enough. When the machine is altogether air-borne  $R_F$  suddenly disappears almost entirely, as now air acts on the sloping front of the body. The result is that  $R_F$  alone is left, increased in magnitude by the increase in the angle of attack, and as the angle of attack also shifts the centre of pressure aft, there is a considerable unbalanced couple tending to overturn the machine forward. The horizontal rudder must now come into play to restore equilibrium, and to give it the requisite anti-clockwise moment about  $G$  the rudder must be

depressed. In order that the machine may quickly assume the new position of equilibrium it must be longitudinally kinetically stable.

Owing to the less dense medium impinging on the sloping part of the fuselage, the drift of that part of the machine is almost entirely done away with, and the unbalanced part of the propeller thrust will accelerate the speed.

As horizontal flight in air is outside our province, we will pass to the time when, the flight over, the pilot is just about to stop the motor in order to *vol plané* to the water. That there may be no sudden alteration in longitudinal stability when the motor is stopped, the line of action of the propeller thrust should pass near the centre of gravity of the machine, otherwise a large unbalanced couple will act till the countervailing horizontal rudder couple is brought to play. It is well to design so that the propeller thrust may not pass exactly through the centre of gravity, but at a certain distance from it, so that on its removal the machine may naturally tilt to the best angle for *vol planing*.

When alighting the reaction  $R_F$  of the water on the fore part of the fuselage leaps into existence, and in a much intensified form, as the nose will probably be driven deeply into the water, though there is a limit to this depth determined by the horizontal fins fitted near the fore end to prevent diving too deeply. If the

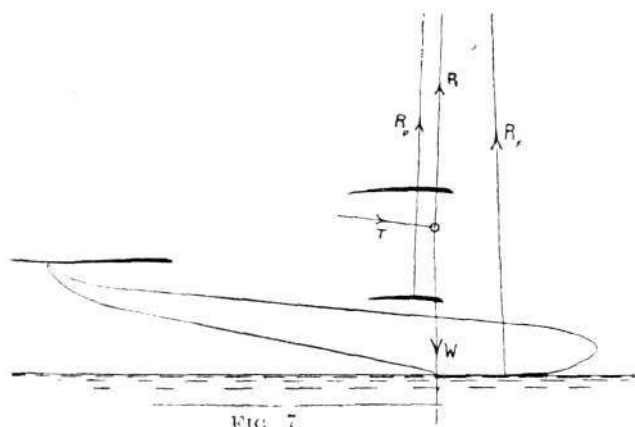


FIG. 7.

augmented reaction  $R_F$  is at too great an angle to the resultant of the combined air-pressures on the planes, the common resultant will swing so far forward that the unbalanced couple will bring the after end down with a jar if the resultant passes in front of the intersection  $O$  of the other forces, or trip up the machine if it passes too far behind  $O$ .

The inclination of the flight path to the horizontal influences the longitudinal stability, which falls off as this inclination increases. When the angle reaches somewhat less than twice the angle of attack, the machine becomes longitudinally unstable. The head resistance, however, has a great effect on the above, as with a greater head-resistance instability would not occur till a greater inclination of the line of flight to the horizontal than that given above was attained. This shows the advantage of rising into the wind, as the relative velocity of wind to machine is increased.

Care must be taken when alighting, as the pilot may not have near objects to guide him as to his real speed relatively to the surface of the water. If the speed of the machine be  $V$ , and the wind happens to blow with a speed  $v$  in the same direction as that in which the machine is travelling, the pilot will not be aware of the change in speed relatively to the water surface, his speed down the wind will now be  $V + v$ , and if he attempts to take the water at this speed an accident may happen due to tripping. If, however, he runs up the wind, his speed will then be  $V - v$ , and he can alight in safety.

To the assumptions which have been made in the case of the "Flying-Fish" must be added the following:—The wash on the tail plane produced by the front plane alters the angle of attack of the former, but probably to a small extent. As the course of the streamlines is unknown, the wind direction as it approaches the rear plane is taken as parallel to that at which it meets the machine.

The gyroscopic effect due to the angular momentum of the propeller and of the rotating engine—if that type be fitted—mixes up the two sets of oscillations, symmetric and asymmetric, and, if these happen to have nearly the same period, resonance effects would be set up, making the machine an uncomfortable one to those on board. The gyration effect due to the above two causes also influences the steering of the machine. If twin screws are fitted, working against one another, then the gyrostatic effects of the rotating inertia of the propellers, rotating engines, also the additional effects due to propeller torque and unbalance of engine, are all eliminated. In some aeroplanes there are contrary-working

screws worked by chain drives from one shaft, one chain being crossed to give the reverse motion. There is also a motor in which the propeller and engine both revolve, as in the Gnome motor, but in opposite directions, so that their gyroscopic effects cancel. We will discuss the case of the engine with propeller attached revolving round the shaft, as this has the greatest effect on both the steering and the longitudinal stability of the machine.

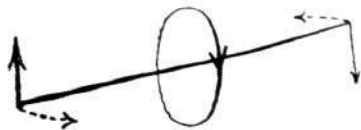


FIG. 8.

By the principle of conservation of momentum, the axis of spin tends always to keep pointing in the same direction, say due east, even though the machine be carried about by wind currents. If by gradually altering the angle to the horizontal by steering in the vertical plane, we apply a couple to the axis of spin tending to tilt it up, the axle will commence to precess in a certain direction determined by

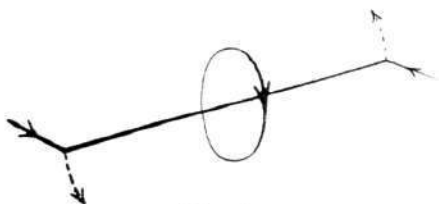


FIG. 9.

the direction of spin and of the couple applied. The greater the magnitude of the couple applied the greater will be the rate of precession. It will be seen from the diagram (Fig. 8) that, with a right-handed propeller and engine turning with it, if a couple be applied by the machine being steered downwards, the precession will cause the head to turn to the left. If this precession be

retarded by applying an opposing horizontal couple by means of the vertical rudder, then the axis of spin will tilt further down at the fore end. If, on the other hand, we accelerate the precession by giving the machine some helm, the whirling parts will tend to cause the forward end to lift.

If a turn is made to the left (Fig. 9), the after end of the plane, owing to precession, will dip down; a sickening feeling to the pilot, who almost invariably turns to the right with a right-turning propeller. Again, the greater the steering couple applied, the greater will be the tendency to dip, as the greater will be the precession. When the aeroplane is to be turned in the horizontal plane, then, not only must the vertical rudder be actuated, but the horizontal rudder must be moved to overcome the gyroscopic influence. With a right-handed screw, if the head of the aeroplane be turned to the left, the horizontal rudder must be inclined to prevent the rear part of the machine from sinking.

The inclination of the propeller shaft does not effect these results, so that, so long as the turning couple is constant so long will the tendency to precess be unchanged; if, however, the revolutions of the propeller be reduced, the rate of precession will increase.

In the Aeroplane Show at Paris this year, the most notable machine from the point of view of inherent longitudinal stability was one designed by M. Drzewiecki, who read a paper before this Institution in 1901. The principle embodied in this design is that of difference in pressure intensity on the forward and the after curved planes, due to the different cross sections. On the involuntary rising of the fore part of the machine, the increase in the angle of attack has quite a different effect on the fore to what it has on the rear plane. The pressure per square foot on the front plane is but very gradually increased for changes of the angle of attack between the limits of  $5^\circ$  and  $18^\circ$ , whereas that on the after plane increases very rapidly with the angle at which the wind meets it. The result is an excess of lift aft which restores the machine to its original position. The converse holds if the front of the machine is involuntarily depressed. The reduction in the angle of attack leaves the pressure on the front plane but slightly altered, but reduces quickly that on the rear plane, resulting in a drop of that part to the normal position.

## KITE AND MODEL AEROPLANE ASSOCIATION.

### Official Notices.

#### British Model Records.

Hand-launched ...	Distance ...	R. Lucas ...	590 yards.
	Duration ...	A. F. Houlberg ...	89 secs.
Off ground ...	Distance ...	C. C. Dutton ...	296 yards.
	Duration ...	A. F. Houlberg ...	80 secs.
Hydro, off water ...	Distance ...	L. H. Slatter ...	45 secs.
	Duration ...	F. G. Hindsley ...	173 yards.
Single-tractor screw, hand-launched ...	Distance ...	J. E. Louch ...	68 secs.
	Duration ...	J. E. Louch ...	45 secs.

**Trials.**—A hydro trial was officially observed (on the application of Mr. Slatter on Sunday morning, at 10 a.m., on the Rushmere Pond, Wimbledon. The official observers appointed were: Messrs. W. H. Akehurst and A. F. Houlberg. The result was that the record of 37 secs. has been raised to 45 secs.

**Exhibitions.**—Applications for displays have been received from the Mayor of Poplar to attend his garden party and also from the Redgrave Park (Diss) Fête Committee. Teams have been selected and will visit both affairs with, it is hoped, good results to the Association. There are one or two vacancies in the team to attend Poplar on the 24th inst. Any member wishing to attend the Poplar display should advise the hon. sec. at once.

**Competitions.**—The efficiency formula in the London Aerodrome Challenge Contest, on August 13th, has been altered to the following:—

Weight of model  $\times$  distance flown

ft. lbs. per min.  $\times$  duration.

**NOTE.**—The ft. lbs. per min. will be calculated in the following way:—

Let A = the ft. lbs. of energy that it is possible to store in 1 lb. of rubber,

A  $\times$  weight of rubber  $\times$  duration

then ft. lbs. =

60.

**Result of Steering Competition.**—This competition was held on July 12th at Greenford. There were 21 competitors. Each competitor was allowed, as usual, three flights in each test, viz., straight ahead, circle to right, circle to left. The judges were Messrs. H. H. Groves, D. Vincent Smith and the hon. sec., who made the following awards: 1st, F. Jannaway, 123 marks; 2nd, L. H. Slatter, 122 marks; 3rd, F. Whitworth, 111 marks. Mr. Jannaway therefore won the handsome cup, L. H. Slatter the silver medal of the Association, and F. Whitworth the bronze medal of the Association.

**Secretaries' Guild.**—The first meeting of this guild was held on Monday, 14th inst., at the offices of the Aeronautical Society. There were present the hon. secs. of most of the affiliated clubs, viz., Aero Models, Leytonstone, North-East London, Paddington, Reigate and Redhill, and Wimbledon. The meeting was a success, and it was decided to meet every sixth Monday to discuss progress of clubs and anything that will benefit model aviation in general. Several suggestions for the council to act on were passed, one being that special prizes should be awarded the club teams that make the best aggregate of marks in the Model Engineer Exhibition competitions.

**Discussions.**—The winter programme is in course of preparation, and the hon. sec. will be pleased to know of anyone who will open discussions or lecture before the Association. The first two gentlemen to offer are Lieut. J. W. Dunne and Mr. A. V. Roe, who are well known in the model world as keen modellers in their day.

**Baden Powell Shield.**—This contest takes place at Wimbledon to-day, at 3 p.m.

**Burton-on-Trent and Littlehampton Meetings.**—Special excursion tickets are being arranged for, and in the case of Burton full details will be sent on application to H. Waude Thompson, Town Hall, Burton-on-Trent. For Littlehampton, special excursion tickets from London will be obtained, and if

intending competitors will send in their entries to the hon. secretary he will arrange for reserved compartments on the train.

**Official Trials.**—The next trials take place at Wimbledon on Saturday, 26th. Entries must be received by Monday, 21st.

27, Victory Road, Wimbledon.

W. H. AKEHURST, Hon. Sec.

### AFFILIATED MODEL CLUBS DIARY.

**CLUB** reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

**Aero-Models Assoc. (N. Branch)** (25, CHURCH CRESCENT, MUSWELL HILL, N.).

JULY 19TH, r.o.g. speed contest, members only. July 26th, attempts for club certificates and records.

**Leytonstone and District Aero Club** (64, LEYSFORD ROAD.)

JULY 20TH, at 6.30 a.m. Hydro practice, Yacht Pond, at 10 a.m., near Brickfields.

**Paddington and Districts** (77, SWINDERBY ROAD, WEMBLEY).

JULY 19TH, Paddington Cup Contest. Competitors must be at judges' flag not later than 3.30 p.m. No flights will be timed after 6 p.m.

**Reigate, Redhill and District** (THE COTTAGE, WOODLANDS AVENUE, REDHILL).

JULY 19TH, flying on Earlswood Common. Postponed novices' competition will take place.

**Wimbledon and District** (165, HOLLAND ROAD, W.).

FLYING as usual July 19th and 20th.

### UNAFFILIATED CLUB.

**S. Eastern Model Ae.C. (1, RAILWAY APPROACH, BROCKLEY).**

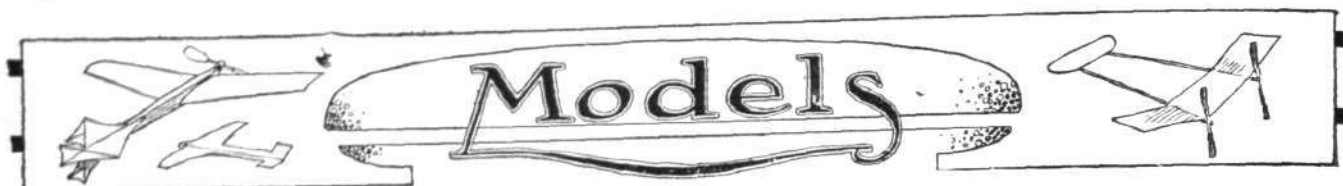
USUAL week-end flying meetings at Blackheath, Mitcham, Grove Park, Woolwich Common and Crofton Park. Entry forms for the "South Eastern Trophy" competition should be sent in as early as possible.

### Cellon Extensions.

IT is gratifying to hear of the extension of firms connected with the aviation industry, and we are notified by the Cellon Co. that owing to the large increase in the demand for their dope they have been compelled to considerably increase their manufacturing facilities. They have arranged, therefore, for the manufacture of the well-known Cellon dope to be conducted in future at the old established Stirling Chemical Works at Stratford, E., under the supervision of the skilled chemists of Messrs. Thos. Tyrer, Ltd. The manufacture will be carried out with the aid of the best modern machinery, and the new product should, if possible, be even better than that supplied by the Cellon Co. in the past. A large stock will be held at the works, and all orders will be executed by return. All orders and enquiries should still be sent to the City offices, 49, Queen Victoria Street, E.C.

Incidentally it may be mentioned that Cellon was used in the Sopwith Bat-boat which won the Mortimer Singer prize, and also in the Sopwith tractor biplane which holds the British altitude records.





Edited by V. E. JOHNSON, M.A.

### Some Model Experiments.

MR. H. G. V. STEVENS (Upper Tooting, S.W.) sends us the following: "I note in a recent issue of FLIGHT that you desire readers to send details of any [practical] experiments they may have made. In a previous communication I mentioned that I was then carrying out some experiments with a steam aeroplane plant, and that when these experiments were completed I would send you particulars. The following is a brief description of the plant:—Engine, single cylinder, double acting, slide valve,  $\frac{1}{2}$  in. by  $\frac{1}{2}$  in., of gunmetal, ordinary marine type, but lightened; weight  $10\frac{1}{2}$  ozs. Boiler, flash type, 8 ft. of  $\frac{1}{8}$ -in. brass tubing, coiled in a spiral and fired by an ordinary petrol lamp, home made, weight  $2\frac{1}{2}$  ozs. The water container of tin [*i.e.*, sheet iron tinned] supplying water to the coils under a pressure of about 50 lbs. per sq. in. Total weight, ready for running, 1 lb. 5 ozs.

"As you see, I made a big mistake in using brass tube for the boiler coils, which, of course, quickly burst, after a thrust of about 4 ozs. (on a normale type propeller, 16 ins. in diam. and 20 ins. pitch) was obtained. On substituting steel coils for the brass and using a higher air pressure, I obtained ultimately a thrust of 12 ozs. on several occasions; theoretically sufficient for a 3 lb. model; but this, in my opinion, in view of later results, is nothing like enough. At any rate, on obtaining this thrust, I made a suitable monoplane for the plant, canard type, 5 ft. 1 in. span and 4 ft. 2 ins. length, total surface 588 sq. ins., loading 12 ozs. per sq. ft. Total weight 3 lbs. 1 oz. After several fires due to the too close proximity of the lamp and coils to the wooden frame or fuselage, I got several fairly good runs up a garden path, and judged that it would be worth while taking it to an adjoining common and testing it, minus wings, to get an idea as to its running speed and thus determine if it would be worth while making wings. This was done, and the model made several exciting trips up and down a gravel path; bumping about terribly (the chassis was unsprung). The speed was perhaps 12 miles an hour, insufficient for flight—I would advise a thoroughly sprung chassis on power models. Such is a very brief account of my experiments, which extended over some four months, working in spare time. The lamp was especially troublesome. I hope soon to start a new plant, and shall use a much stronger and lighter engine, together with a more powerful generator. I think that unless a model is fitted with a plant capable of giving a thrust of quite half its weight it is useless to expect good results.

"In a series of tests with rubber models I have noticed that the thrust of the propeller was far in excess of one-quarter their weight, indeed in a model weighing 4 ozs. the propellers gave a static thrust of over  $2\frac{1}{2}$  ozs. When the power was reduced so that each propeller gave only  $\frac{1}{2}$  oz. thrust, the model refused to lift from the ground and fly."

Referring to the above very interesting experiments Mr. Stevens certainly made a great mistake in not testing his model in the open when fitted with wings. The fact that the plant would drive the unwinged model along more or less bumpy ground at a velocity less than the flying speed, is no criterion that the complete one would not have risen off a good and level surface. It is the air lift on the wings which, by reducing the ground friction, permits the model to accelerate and ultimately fly. Off a good surface, given a really efficient model—efficient, that is, in possessing minimum head resistance and maximum lift—a static thrust of one quarter the total weight of the model is sufficient to cause it to rise. I say nothing about rapid climbing, but it will fly it. Mr. Stevens will find a pump feed far preferable to a pressure one, being, when properly adjusted, practically quite constant; it is also less in weight, since the water reservoir can in this case be made extremely light.

The type of engine and valve (rotary) used by Mr. H. H. Groves is also better suited to aeronautical work, although it is most interesting and instructive to know what can be done with other types.

Mr. R. V. Tivy also writes: "I have for the last six months been building and testing a 20-oz. rubber-driven model with 'Weiss' wings. I find it is impossible to get any but short flights out of this model, as a rubber drive does not lend itself at all to scale models. I am now having a steam engine built (of which you shall have particulars in due course), and shall be very fortunate if I get any flights before the M.E. Exhibition.

"Thus one experiment will take me a year to carry out, and you can hardly expect to have your columns filled with the results of

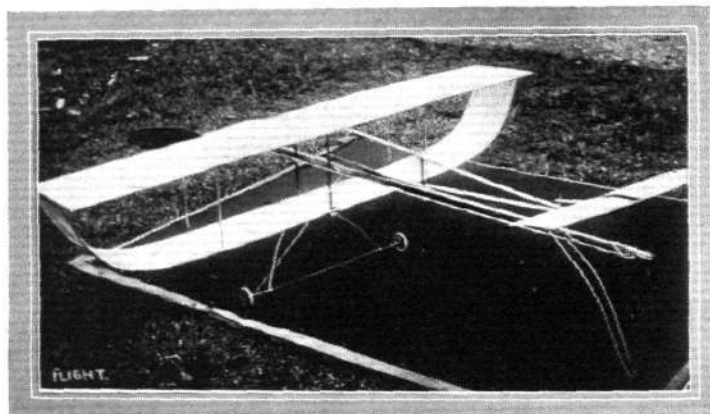
such experiments. Everyone I know who is anxious to do experimental work has practically no spare time at all.

"Referring to the description of my Olympia model, the action of the automatic cambering tail is rather too complicated to be described, and I am fitting a somewhat similar tail to the 'Weiss' model I am exhibiting next October at the M.E. Exhibition, when those of your readers who are interested will be able to examine it."

### Some Suggested Experiments with Models.

We publish an illustration (from a photograph) of the machine flown by Mr. G. P. Bragg-Smith, in the K. and M.A.A. weight-carrying competition. The total weight (including 4 ozs. dead weight) was  $1\frac{3}{4}$  lbs.; span, 52.5 ins.; length, 54 ins.; chord of upper main plane, 8 ins.; of the lower curved plane, 6 ins.; the lower plane being given an increased camber in order to equalise the lift on the two planes. The propeller had a diameter of 19 ins., and the blade area was considerable. Elevator dimensions, 18 ins. by  $3\frac{1}{2}$  ins.; distance between trailing edge of elevator and leading edge of top main plane, 27 ins.; distance of propeller from trailing edge of same, 12.5 ins.; gap in centre, 8.5 ins.

The most interesting item by far about the model was the arrangement of the planes, which, instead of being staggered in the usual manner, were so arranged that whilst the entering edge of the top plane was two inches forward of the entering edge of the lower, the trailing edges of the two planes were in the same vertical plane;



Mr. G. P. Bragg-Smith's weight carrying model.

the lower plane being given, as already stated, an increased camber to make up for its lesser area.

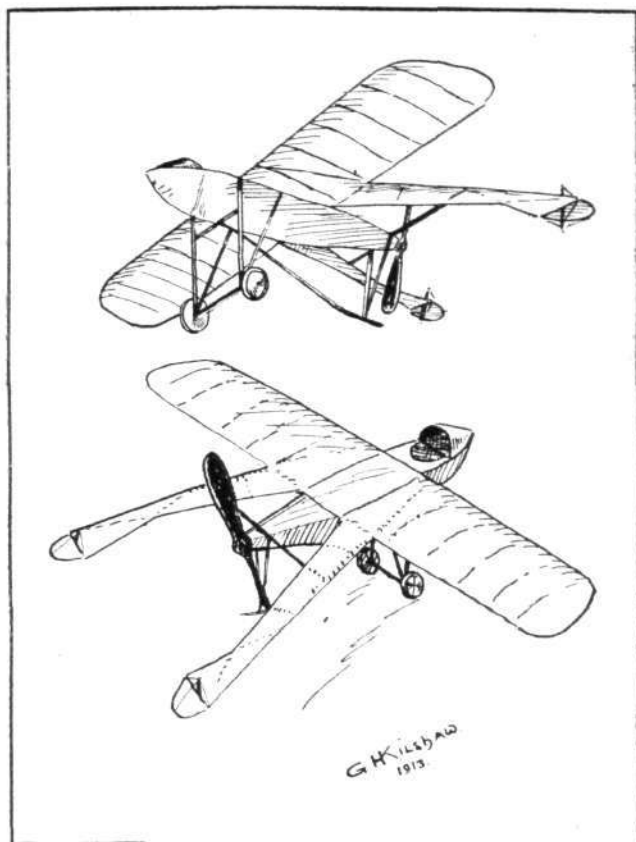
The designer claims for this arrangement that it has all the advantages of the staggered form of planes, without some of the latter's disadvantages. The manner in which the air leaves the planes, as is well known, is of the greatest importance—much more so, in many respects, than the manner in which it impinges on it; and it will be noticed in this arrangement the air leaves both planes in the same vertical plane, just as in ordinary biplane with non-staggered planes.

Now, here is an experiment which any reader of FLIGHT who can build a decent model can carry out, and the results would not only be interesting, but quite possibly of value in full-sized practice, viz., to build three models (some 4 ozs. to 8 ozs. in weight), all biplanes, and all exactly similar—save that in one the planes are non-staggered, in the second model they are staggered, and in the third Mr. Bragg-Smith's arrangement has been adopted. Having built the models, submit them to a series of tests in actual free flight, and note carefully each flight re steadiness, stability, gliding angle, duration, &c.

The type chosen need not necessarily be that illustrated in the photograph, which is patented, although we do not think the inventor would offer any objection to the building of such for an experimental purpose of this character. The models would, of course, require to be very carefully built with constant recourse to the balance to see that the various items not only looked equal but were actually so. The same propeller could be used on each model and the rubber motors interchanged, and various other precautions

adopted to prevent errors, especially cumulative ones. The mean of some score of separate flights, *i.e.* 60 in all, should be taken; as such would give a far more reliable result than merely a few flights.

We give also two drawings of a novel design sent us by Mr. G. H. Kilshaw. "It was designed," says our correspondent, "for



the proposed 'Liverpool Flying Corps' stand at the local International Exhibition. The design lends itself admirably for a military type; it has a span of 5 ft. 8 ins. with a 10 in. chord. The chief points in its favour are: Short body, enabling a short driving shaft for the propeller; freedom from propeller blast working on the tail or main plane or body, which, apart from other reasons, should be a gain in efficiency. Free range for gun-fire, and absence of propeller-draught to annoy pilot or passenger. I trust the above will prove of some interest, and will send further particulars when tests are complete."

The above model should prove of interest to anyone possessing a power plant and desiring to test it on "something new." The design is one which at first sight does not appear to adapt itself at all for a rubber motor, but by running a skein down each fuselage or "leg" from the nose of the machine, and using three gear wheels, one (the middle one) fixed on the propeller-shaft, which must, of course, have a length about equal to that of the middle body; such could undoubtedly be used with success, and a flight of at least half a minute obtained—quite sufficient for observation purposes.

We would like to see some of our readers (besides Mr. Kilshaw) try such a design in practice—we are quite sure the results would be both interesting and not without value. Experiments are much needed with *uncommon* types. We propose next week to deal with some simple experiments that can be carried out in a small wind tunnel, together with some directions on the construction of the same.

#### The Scientific Side of Model Aviation.

Mr. O. Hamilton (hon. sec. Stony Stratford Model Club) sends us a letter relative to the above. As already stated in a previous issue, we much prefer *practical results from both parties*, the controversial side of the question having, we think, received due attention. The following is his communication:—"I have come to the conclusion that this controversy is mainly caused by: (1) the successful man whose machines fly with a more or less reputed clockwork regularity; (2) those who fear the sarcasm of the crowd over possibly inefficient machines (this latter being a generalisation only, and does not apply to actual correspondents). The idea that has prompted this letter is the unfortunate result that such arguments bring to current clubs, and the discouraging and crushing effect they have upon any wavering members. I think it is quite

reasonable for any club to allow of the introduction of a 'research section. Further, if the 'scientific,' instead of rushing with their moans to the columns of the Press, were to join one of the various clubs and drag them from the morass of the 'flying-stick,' more practical results would emanate; instead of this, at the present time, the cry simply seems to be for a collected building of a powered scale model on co-operative lines. I agree the present model has only the appearance of a flying-stick, but with respect to those who are so free with their remarks about children and toys amongst the lay public, I would challenge them to produce such a toy and get a reasonable result at the first attempt. I know from personal experience that those who came to scoff at the attempts of others began to do something very different when they tried themselves. To draw the attention of the public to model aviation, you must be prepared to have something spectacular, something of a concrete nature to show them. First of all get their interest and activity, and then draw them to the more scientific and interesting side of the subject. In conclusion, our club is definitely prepared to accept those who are interested that way."

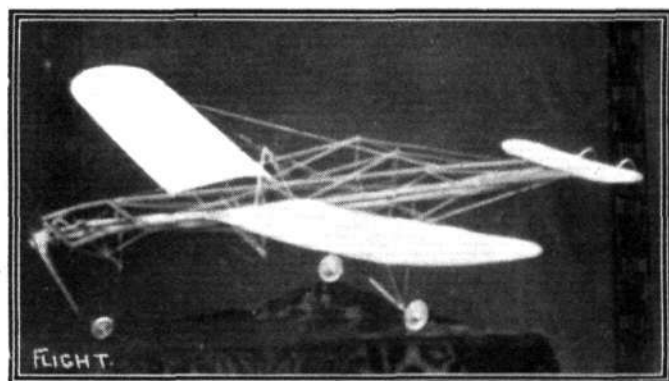
#### Model Club for Victoria (British Columbia).

Mr. G. T. Fleming (c/o Willow Park P.O.) will be pleased to hear from anyone in the neighbourhood of Victoria who may be interested in model aviation, with a view to forming a practical model club in that district.

#### Mr. L. H. Slatter's Weight Carrying Model.

We give in this issue a photo of the above model and the following particulars kindly supplied us by Mr. Slatter:—

"It is the first of its kind that I have ever made—in fact, I have never even made a single-propeller machine before. The very large



Mr. L. H. Slatter's weight carrying model.

amount of wiring is due to its being built of small-section wood—the only kind I had by me—for the length, *viz.*, 3 ft. 6 ins.

"The planes were rigidly fixed and braced to 'cabanes.' Twin-gearing was used, but the gear-wheels were not reliable; consequently, when I had the machine tuned up—*i.e.*, when it made its 10.4 secs. flight in the competition and I had 110 turns on the motor—the gears were badly worn. The propeller used had a diameter of 12 ins. and a pitch of 18 ins., span of main plane 40 ins., chord of same 8 ins. Total area, 350 sq. ins.; weight, unloaded, 12.5 ozs. I intend constructing a stronger machine of the same type, and I will let you know with what success. The machine had never been tested before the competition, only being finished about noon on Saturday." [Gear-wheels should be of steel, not brass, and should be specially cut.]

#### The Economic Electric Co.'s Catalogue.

"We have received from the above (E.E.C., Twickenham, London, S.W.) a copy of their profusely illustrated catalogue, now in its seventeenth edition. Every conceivable form of model electric accessory is listed and illustrated, as well as many of a larger type. In addition to these a very large number of useful tools are treated in a similar manner, and the possessor can see both the nature and the price of the tool at a glance. A limited number of aeroplane materials are also listed, as well as some aero electric motors. With regard to these, the vendors state, in reply to a query of ours, that these latter are for scale models and purposes of research; not for flying models, owing to accumulator difficulties. Every branch of model mechanical work is more or less dependent on certain other branches, and the reader will find the catalogue, which contains 110 pages and costs 1d., well worth possessing; an adequate index greatly adds to its value. As every page is profusely illustrated, the total number of illustrations, as can be seen, is very large.



# CORRESPONDENCE.

## Factors of Safety.

[1768] In its report for 1912-13, recently issued as a Parliamentary Paper (Cd-6858), the Government Advisory Committee for Aeronautics draws the attention of aeronautical constructors to the necessity of adopting an ample factor of safety in aeroplane construction. There is, however, a tendency among aeronautical designers to use the term "factor of safety" in a loose and vague manner, and it is unfortunate that the Committee has not given to that term the precision which it has in any other branch of engineering.

The term "factor of safety" of a structure has a precise and definite meaning only when it refers to the maximum abnormal stresses to which that structure may be subjected, and which can be foreseen. Thus a structure, having a factor of safety, 6, will only give way when it is subjected to stresses six times as great as those obtaining under the most unfavourable conditions. In applying the term "factor of safety" to aeroplane construction we should, therefore, be careful that it is only with reference to the maximum abnormal stresses to which an aeroplane may be subjected.

The practice among most, if not all, aeroplane constructors is to employ a factor of safety with reference to normal stresses only. In the case of a wing, for instance, the factor of safety is used with reference to the load per unit area, that is only to the normal stresses to which the wing is subjected. Such a factor of safety is evidently illusory, as it does not apply to possible abnormal, although natural, stresses.

Let us consider an aeroplane whose normal speed is 30 metres per second. In a fairly stiff wind the machine is tossed about and may, at any moment, be inclined at an angle of 20°. Now, at that inclination, the air-pressure on the wings will be practically equal to the pressure which they would experience if they were moving normally. But the sudden variations in the speed of the wind may easily reach 10 metres per second. Therefore at an inclination of 20°, the wings of that aeroplane may be subjected to a pressure nearly equal to that exercised on a plane surface moving normally at 40 metres per second, i.e., a pressure of about  $0.08 \times 40^2 = 128$  kilos. per square metre. Even this figure, however, cannot be regarded with absolute certainty as the maximum normal stress, and allowance should be made for this possibility. Now if we wish the wings to have a factor of safety, 4, they must be made strong enough to resist stresses of  $128 \times 4$ , i.e., of 512 kilos. per square metre.

If we had based our calculations on the normal stresses only, i.e., on the load of 15 to 25 kilos. per square metre it would be seen that with a factor of safety, 4, the wings would only be able to resist stresses of 60 to 100 kilos. per square metre, which are much below the possible stresses of 128 kilos. per square metre. It is thus seen that, in the case under consideration, the factor of safety, 4, is no factor of safety at all, since even by its use the aeroplane is not assured against the possible stresses of 128 kilos. per square metre.

The necessity of using the term "factor of safety" with reference to the maximum abnormal stresses is thus made evident, and it is to be hoped that the meaning which that term bears in other branches of engineering will equally be made to apply to aeronautics.

L. BLIN DESLEDS.

(Lecturer in Aeronautical Engineering at the University of Sheffield and at the Polytechnic, London).

## The Future of the Dreadnought.

[1769] I welcome No. 1,764. All useful criticisms of the remarks I have put forward from time to time in your columns have come from naval officers.

The article in question was condensed, perhaps rather carelessly, from a longer one, and "Cruiser Squadron" is quite justified in suggesting investigation so far as you can spare space.

I am particularly busy at the moment, but will put forward the following considerations to keep alive discussion for the time.

1. The command of the sea can be obtained, and held, by any vessel faster and more powerful than the merchantman, provided she can knock out her opposite number.

2. The "Dreadnought" endeavours to do this by the effective use of the heavy horizontal projectile travelling through the air.

3. To apply this heavy projectile she is necessarily made large, cumbersome, and slow, and in consequence,

4. Her safety is being seriously threatened by a still more effective heavy projectile travelling under water, which can be used in any weather in which her guns are effective.

5. This under-water projectile will soon be discharged by mosquito aircraft which she will be quite unable to destroy, but for the present they can only operate in fine weather.

6. These aircraft, judging by the rapidity of recent development, will soon be able to operate in fairly bad weather.

7. These aircraft can be supported by large dirigibles using extremely effective vertical projectiles (both explosive and incendiary), which are likely soon to be able to keep the air for days at a time, and to be little vulnerable to gun-fire.

8. If the "Dreadnought" is provided with horizontal armour, she will become more cumbersome than she is now, and it is difficult to see what sort of horizontal armour can be expected to keep out burning petrol. There must be holes for vertical fire guns at least.

9. It comes to this, that the "Dreadnought" will have to be armoured, and heavily too, against horizontal projectiles, both under-water and aerial, and against vertical projectiles from the air. She will be too slow to count at sea, and she will be vulnerable to vessels constructed at a fraction of her cost. Whenever she is found at sea, unsupported by her own aircraft, the wireless waves will ripple, and "Where the carcass is, there will the eagles be gathered together!"

10. The day of the heavy horizontally propelled air-projectile will pass once for all, because it needs a heavy engine (the gun) to propel it, and a heavy carriage (the armoured battleship) to carry that engine, and because projectiles more effective can be launched in such a way as to take advantage of the force of gravity instead of having to counteract it.

11. As aircraft of all sorts become more efficient, ships will become smaller and faster, with an increasing proportion of their armament available for vertical action; their guns will be light with extreme rapidity of fire.

12. Finally sea power will go for little, and air command will be of supreme importance.

Improvements to be expected soon are non-explosive gas for dirigibles, which can be absorbed and given out again as required, and the adaptation of the "hydro-aeroplane," or whatever the seagull type is to be called, to use torpedoes. Also an increase of efficiency in all sorts of air vessels. At present things are in their infancy, in this country hardly a vigorous infancy perhaps.

As for firing torpedoes from the seagull type, there is a vessel now in existence with a double-boat body for a float. What easier, as soon as efficiency has been obtained by trial and error in the existing vessel, than to increase the scale to carry the extra weight, leave room between the boats to lash a torpedo, lay the ship, and cut the torpedo adrift as soon as you touch the water? Even this primitive arrangement might well dispose of a battleship in a dull light, when the seagull could get into 3,000 yds. or 4,000 yds. without being seen. Multiply the seagull by fifty, fit proper appliances, and where is your battleship?

Now these considerations may be merely, in Disraeli's words, "the hare-brained chatterings of irresponsible frivolity." But are they? They are, at any rate, written by a man who has put in some thirty years in the country's service, whose favourite reading from boyhood has been military and naval history, and who has followed aerial developments with a careful, albeit untechnical, eye from the beginning. Should they constitute a forecast, even approximately correct, it will be admitted that our comparative neglect of the air services is likely to be a most serious danger to the Empire.

MAJOR, R.A. (retired).



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